MEASURE AND MANAGE

The Importance of Maintaining and Building Soil Organic Matter

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The importance of Organic Matter in soils is simple it improves the Quality of soils. Soil quality is hard to define in just one word or phrase. Most farmers will say they know a good soil when they see it. This anecdotal observation although valid does not provide the insight and management practices it takes to produce, maintain or improve soil quality.

A high quality soil is one that should have the ability to buffer against degrading practices and recover quickly from such things as compaction. The one feature that allows this to happen is continuous supply of organic matter and associated land management practices to manage the conditions that allow this to take place.

Soil quality is a wide term which can include proper pH and limestone applications to building and maintaining P and K and managing Nitrogen. We will talk mostly about soil quality in terms of physical structure. Improving soil structure is a nurturing process involving a holistic approach.

The soil organic matter content is the most important aspect in improving soil quality. The general approaches to building and maintaining soil organic matter include adding organic matter from manure, compost, and crop rotation, reduce erosion, and reduced tillage**.**

Organic Matter consists of 3 forms, the living, the dead and the very dead.

The living form consists of earth worms, micro-organisms and insects. These forms represent about 15% of the total Organic Matter content. The living form starts the breakdown of manures and crop residues it is their food source for energy and proteins. The by products of their activity are release of soil nutrients and sticky exudates that provide the glue to hold individual soil particles together to form stable aggregates. It is these aggregates that give structure to the soil provide pore space for air and gas exchange, hold water, improve drainage and reduce bulk density.

The importance of these aggregates and soil structure is to increase water infiltration, reduce erosion and provide an ideal root zone.

The fresh organic materials or **the dead** form consists of recently added crop residues, dead organisms, plant roots, and manures. This active fraction of the organic matter is the most important food source for the various organisms. The breakdown of these materials provides energy and proteins for other organisms. These molecules do not last long as they are a readily consumed by other organisms in the cycle of residue breakdown.

The **very dead** form is referred to as humus this is the final destination of organic materials and no longer serves as a food source for organisms. Humus is relatively stable. The particle size of humus is very fine and colloidal in nature. Humus imparts very important chemical properties to soils. It holds nutrients for

slow release. Humus can coat clay particles and reduce the stickiness of these soils and improve structure and drainage. Humus in sandy soil can increase the moisture holding capacity.

The % Organic Matter reading on our soil reports encompasses all of these forms.

A well structured soil has properties that enhance soil quality, by providing an environment to encourage the growth of healthy crops, by maintaining adequate moisture with the macro and micro pores, large root zone volume, support desirable organism growth which can take residues and turn them into more organic matter.

A **degraded soil** is one which lacks adequate organic matter and the activities that are promoted by organic matter additions. Soil degradation is increased when soils are worked wet and become compacted. Increased risk of erosion results and the downward spiral of soil quality begins. A soil with poor structure lacks sufficient aggregate formation to support vigorous crop growth. In addition an environment fails to develop conducive to organisms that can breakdown residues. Indeed soils low in organic matter may lack a host of organisms that can breakdown pesticide residues. This lack of organisms can allow an increase in persistence of chemicals and cause crop damage. This is one of the reasons that many herbicides have label rates tied to organic matter and texture.

On the **Agri-Food Soil Report** you will see 3 new values reported, Percent of CEC from the Organic Matter, Target Organic Matter Level, and an assessment of Aggregate Stability. These 3 parameters are empirical in nature and are meant to raise awareness of the importance of Organic Matter and Soil Quality.

The **Percent of CEC from Organic Matter** is a simple indicator that illustrates the impact that organic matter can have of this important soil property of Cation Exchange Capacity (CEC). This is especially important in sandier soils as the CEC can be mostly contributed to the Organic matter level. CEC is an important property that increases the soils ability to hold and release elements such as K,Mg, and Ca to soil solution and increase the soils ability to hold them against leaching losses. In a clay soil the CEC is already high but by having a significant level of organic matter the CEC is increased further resulting in improved soil structure and root zone quality allowing for greater root massing.

The **Target Organic Matter Level** is an estimation of the organic matter level that would maximize the likelihood of achieving water stable aggregates to improve soil quality. It is a regression between clay content and desired organic matter level needed to maximize soil aggregate development.

Aggregate Stability is a highly empirical interpretation of how stable the soil aggregates would be relative to the present organic matter level compared to the deviation from the target level. It is ranked as poor, fair and good. The further the actual soil test OM level is below the desired or target level, the greater the chance of poor soil aggregation.

Soil is the producers' most important asset. It took Mother Nature 10,000 years to make the topsoil we have to day. Protecting, nurturing and improving soil quality is a legacy that most farmers strive to accomplish. Agri-Food Laboratories is providing an empirical measurement of one of the most important parameters, organic matter and the associated benefits of managing for soil quality.