

Increasing Soil Organic Matter for Optimized Crop Production in Climate Extremes

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How can farms manage their soils for continuous high performance when unusual weather patterns are the new normal? The general consensus is that increasing soil organic matter (SOM) can improve its ability to support several critical soil functions. System resilience is the ability for your soils to support high yields despite climate extremes.

Rotation, rotation, rotation...

If you aren't doing it already, aim to rotate every three years between legumes, small grain, corn silage and/or corn grain or snaplage. Strategize which fields will get that boost of organic matter from left-over stover. Many of our northeast farmers already do a fantastic job with rotation. Not only will crop rotation boost resilience through increased SOM, but it also boosts resilience through diversifying the microbial communities that contribute to soil health, productivity, and supports beneficial insect communities that help break pest cycles.

Cover Crops and Double Crops

Cover crops are being planted on an increasing number of acres every year. Farms are achieving this by assigning someone the task of following the chopper with a seeder to get cover crops planted as early as possible. Also, more and more farms are turning to inter-seeding to get cover crops in the ground in early summer (see our previous ACS newsletter). Cover crops are giving rise to more diverse rotations and double cropping, all of which increase SOM.

Reduced Tillage and Planting Green

The use of cover crops and double crops tightens the planting window in the spring and many farms are experimenting with reduced tillage systems over their whole rotation - particularly in the spring transition so they can plant sooner. Although planting green is not an easy task, it has the potential to deliver the trifecta of reduced SOM loss, increased SOM from letting the cover crop grow longer, and reduced soil erosion.

Reducing Soil Compaction

Reducing tillage will minimize soil compaction, but there are other management practices that can be considered to that end. For example, manure is often moved at the ends of the seasons when soil moisture is not ideal for carrying heavy equipment. Some farmers are moving liquid manure with a drag hose instead of heavy trucks. If they don't own their own drag hose, they may hire custom operators.

Measure it to Manage it

Pick a soil tests from the list below to run on 5 or 10 fields every year to help identify which management practices are most effective, which parts of the rotation are building SOM, and which

parts are drawing them down. Tracking different rotation years on different fields can provide feedback that will help fine-tune field practices to achieve the desired result in SOM at the end of a rotation. Tests that are recommended by ACS consultants are listed below:

Solvita® CO₂ Burst Test measures the amount of CO₂ released from the soil as a result of microbial respiration. High levels of microbial activity are good indicators of high SOM.

Illinois Soil Nitrogen Test (ISNT) is a soil test that measures the amount of nitrogen that could become mineralized from organic matter in the soil if the soil is warm, moist and well-aerated. ISNT results can be used immediately to manage nitrogen in farm fields and also long-term as an indicator of how management practices are impacting the active organic matter fraction.

Cornell Soil Health Test subjects a soil sample to fifteen different analyses that assess the physical, biological and chemical performance of the soil and includes assessments that can be used to track both stable and active fractions of SOM.