

The Martin Farm

Maintaining soil organic matter with cover crops, crop residue and organic amendments

Soil Organic Matter (SOM) is the portion of soil made up of plant and animal residue. Considered the most important component of soil, organic matter has many beneficial properties. For example, increasing organic matter by just 1% can increase the water holding capacity of your soil, reducing the effects of drought.

The Martin Farm's Soil Organic Matter Balance

North of Port Albert in the Garvey-Glenn watershed, the Martin's do a lot to maintain organic matter, but is it enough? Understanding how the Martin's management practices influence their SOM is vital to identifying what they are doing right and areas that can be improved. By using a model, we were able to compare the SOM at the Martin Farm to other common management practices. To run the model we used soil test data, land management data and biomass survey results. With this information, the model predicted how the different management systems influence SOM over 50 years.

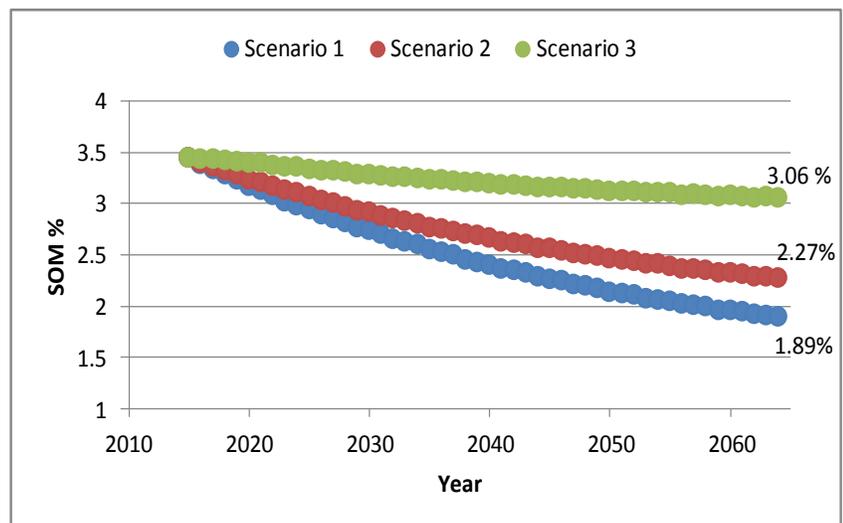
SOM Trend Over 50 Years

Model Scenarios

Scenario 1: (Standard Practice) C-S-W, conventionally tilled, no manure applied and no cover crops are used

Scenario 2: (The Martin Farm): C-S-W, conventionally tilled (no-till wheat), dry hog manure is applied after wheat and cover crops are planted every 3 years

Scenario 3: (Multi-BMP's) C-S-W, no-till, cow manure is applied after wheat and cover crops are planted every 2 years



A percentage of SOM is lost each year. If SOM is not replaced, levels will drop over time until the inputs match the outputs. This is why levels appear to level out eventually.

Out of the management scenarios compared, over 50 years, the first had the lowest SOM and the third had the highest. Despite the overall decline across all practices, this model shows that following conventional practices results in the lowest SOM levels, while using a suite of BMP's results in higher levels.



Cover crop example



Light disc – residue trial



Tillage equipment



Aggressive disc – residue trial



Why is SOM changing over time?

Management decisions impact how much SOM is added to your soil, as well as how quickly it is lost.

ADDITIONS:

Crop Rotation – Crops produce different amounts of SOM. Corn for example produces a greater amount of biomass (stover) than soybeans. The Martin's corn crop adds 1440 kg/ha, while soybeans just 500 kg/ha.

Cover Crops – Capture sunlight and create SOM once typical crops have been harvested or have shut down for the season. The Martin's added 737 kg/ha of SOM using cover crops after wheat.

Manure – A great source of nutrients and contributes to SOM. Relative to standard practices, the Martin's do a good job of trying to maintain SOM. By applying dry hog manure after wheat, they add ~1350 kg/ha of SOM.

LOSSES:

Tillage –Increases the breakdown of SOM. Reducing tillage saves SOM that is so hard to build.

With the Multi-BMP approach, the practices in this management system work together to build SOM. Introducing these practices to your operation will help improve your soil organic matter balance and overall soil health.

Cover crops used at the Martin Farm:

Images: Clark, Andy (ed.). 2007. Managing Cover Crops Profitably, 3rd ed. Sustainable Agriculture Network, Beltsville, MD.



OATS

Oats establish well and kill easily over the winter. They grow quickly and their fibrous roots can reach 84 -195 cm. They outcompete weeds and are a great companion crop to legumes.



RED CLOVER

Red clover is a dependable, low-cost, readily available workhorse that is winter hardy. Easily overseeded or frost seeded into standing crops, it creates loamy topsoil, adds a moderate amount of N, helps to suppress weeds and breaks up heavy soil.