

Soil Organic Matter (SOM) – Its Importance in crops across the USA

What is soil organic matter?

That component of soil that contains carbon, once part of living organisms, plants, microbes, animals, insects, nematodes, viruses, root exudates, synthetic biochemical (petroleum, crop chemicals), etc. SOM is heterogeneous.

Range in SOM content of soils

SOM content can range from negligible in some coarse sandy soils to >80% in Histosols. Typical sandy soil in a field may contain from 0.5 to 2.5% SOM (some a little more), depending on the type of soil and the moisture content.

The importance of soil organic matter

Physical

- Helps soil form clumps adding structure (enhancing aggregate stability)
- Reduces soil bulk density – reduces soil compaction
- Increases water-holding capacity; SOM can hold 20X its weight in water

Chemical

- Increases cation exchange capacity
- Adds nutrients to soil upon mineralization
- Interacts with crop chemicals

Biological

- SOM provides carbon and nutrients for soil microbe growth

What happens to SOM in many cropping situations?

The carbon cycle is active in the soil (carbon is added, cycles, and carbon is used). Plant roots (when they die and decompose) add SOM, weeds add SOM when we desiccate them with herbicides, and cover crops add SOM. We can add OM when we add compost, manures, or other sources of OM. This OM must be replenished as it is mineralized. SOM will decline if we do not provide a means for maintaining or increasing it. Sandy soils are highly oxidative, thus SOM is rapidly mineralized (decomposed). It is difficult to build up SOM in sandy soils to high levels.

Increasing SOM

SOM can be increased by:

- Applications of OM – manures, composts, cover crops. Best to incorporate or “inject” added OM sources at planting or during the growing period (very important for young plant establishment)
- Increasing soil microbial activity – microbes decompose plant residue and themselves add OM when they die

Decreasing SOM

SOM can be decreased by:

- Constant tilling – this stirs soil exposing OM to oxidation
- Constant destruction (herbicide, cultivation) of plants such as weeds, cover crops, etc.
- Drying soil

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