

Soil Health - Organic Matter—Adams County, Indiana
(AdamsColN_Doc#13_Soil Health_Organic Matter)

Map Scale: 1:31,300 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge ticks: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

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Soils

Soil Rating Polygons

 ≤ 2.00
 > 2.00 and ≤ 2.50
 > 2.50 and ≤ 3.50
 > 3.50 and ≤ 4.00
 > 4.00 and ≤ 5.00
 Not rated or not available

Soil Rating Lines

 ≤ 2.00
 > 2.00 and ≤ 2.50
 > 2.50 and ≤ 3.50
 > 3.50 and ≤ 4.00
 > 4.00 and ≤ 5.00
 Not rated or not available

Soil Rating Points

 ≤ 2.00
 > 2.00 and ≤ 2.50
 > 2.50 and ≤ 3.50
 > 3.50 and ≤ 4.00
 > 4.00 and ≤ 5.00
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Adams County, Indiana
 Survey Area Data: Version 23, Jun 2, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 14, 2019—Oct 23, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Soil Health - Organic Matter

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
BgmA	Blount silt loam, ground moraine, 0 to 2 percent slopes	2.50	1,587.8	33.3%
BgmB	Blount silt loam, ground moraine, 2 to 4 percent slopes	2.00	735.6	15.4%
GlsB	Glynwood silt loam, ground moraine, 2 to 6 percent slopes	2.00	11.2	0.2%
Mh	Milford silty clay loam, 0 to 2 percent slopes	5.00	16.6	0.3%
MsoA	Minster silty clay loam, till substratum, 0 to 1 percent slopes	3.50	3.5	0.1%
Pm	Pewamo silty clay, 0 to 2 percent slopes	4.00	2,409.8	50.6%
Totals for Area of Interest			4,765.0	100.0%

Description

Organic matter percent is the weight of decomposed plant, animal, and microbial residues exclusive of non-decomposed plant and animal residues. It is expressed as a percentage, by weight, of the soil material that is less than 2 mm in diameter.

Significance:

Soil organic matter (SOM) influences the physical, chemical, and biological properties of soils far more than suggested by its relatively small proportion in most soils. The organic fraction influences plant growth through its influence on these soil properties. It encourages soil aggregation, especially macroaggregation, increases porosity, and lowers bulk density. Because the soil structure is improved, water infiltration rates increase. SOM has a high capacity to adsorb and exchange cations and is important to pesticide binding. It furnishes energy to microorganisms in the soil. As SOM is decomposed by soil microbes, it releases nitrogen, phosphorous, sulfur, and many micronutrients, which become available for plant growth. SOM is a heterogeneous, dynamic substance that varies in particle size, carbon content, decomposition rate, and turnover time. In general, the content of SOM is highest at the surface—where plant, animal, and microbial residue inputs are greatest—and decreases with depth.

Total organic carbon (TOC) is the carbon (C) stored in SOM. Total organic carbon is also referred to as soil organic carbon (SOC) in the scientific literature. Organic carbon enters the soil through the decomposition of plant and animal residues, root exudates, and living and dead microorganisms. Inorganic carbon is common in calcareous soils in the form of calcium and magnesium carbonates. In calcareous soils, the content of inorganic carbon can exceed TOC.

Factors Affecting Content of SOM and SOC:

Inherent factors - Soil texture, parent material, drainage, climate, and time affect accumulation of SOM. Soils that are rich in clay have greater capacity to protect SOM from decomposition by stabilizing substances that bind to clay surfaces. The formation of soil aggregates—enabled by the presence of clay, aluminum and iron oxides, fungal hyphae, bacterial exudates (carbohydrates), and fine roots—protects SOM from microbial decomposition. Extractable aluminum and allophanes, which are present in volcanic soils, can react with SOM to form compounds that are stable and resist microbial decomposition. Warm temperatures increase decomposition rates of SOM. High mean annual precipitation increases accumulation rates of SOM by stimulating the production of plant biomass.

Loss of SOM through erosion results in SOM variations along slope gradients. Areas of level topography tend to have much more SOM than areas with other slope classes. Both elevation and topographic gradients affect local climate, vegetation distribution, and soil properties. They also affect associated biogeochemical processes, including SOM dynamics. Analysis of factors affecting C in the conterminous United States indicates that the effects of land use, topography (elevation and slope), and mean annual precipitation on SOM are more obvious than the effects of mean annual temperature. However, when

other variables are highly restricted, SOM content clearly declines with increasing temperature.

Dynamic factors - Dynamic gains and losses in SOM are due primarily to management decisions in combination with climate and microbial influences. Accumulation of SOM is controlled by the rate of C mineralization, the amount and stage of decomposition of plant residues, and the addition of organic amendments to soil.

Soil organic carbon comprises approximately 52 to 58% of the SOM and is the main source of energy for soil microorganisms. The C within plant residues, particulate organic matter, and soil microbial biomass is generally considered to be within the active pool of SOM. The emergent view of SOM focuses on microbial access to SOM and includes an emphasis on the need to manage C flows rather than discrete C pools. During decomposition of SOM, energy and nutrients are released and utilized by plant roots and soil biota. Recognizing that SOM is a continuum of decomposition products is a first step in designing management strategies for renewing SOM sources throughout the year.

Soil aggregates of various sizes and stabilities can act as sites at which SOM is physically protected from decomposition and C mineralization. Soil disturbance and aggregate destruction increase biodegradation of SOM. Aggregates are readily broken apart by tillage operations.

Crop residues incorporated into or left on the soil surface reduce erosion and the losses of SOM associated with sediment. In acidic soils, applications of lime increase plant productivity, microbial activity, organic matter decomposition, and CO₂ release.

The diversity of the soil microbial population affects SOM. For example, while soil bacteria and some fungi participate in SOM loss by mineralizing C compounds, other fungi, such as mycorrhizae, facilitate stabilization and physical protection by aggregating SOM with clay and minerals. SOM is better protected from degradation within aggregates than in free-form.

Relationship to Soil Function:

SOM is one of the most important soil constituents. It affects plant growth by improving aggregate stability, soil structure, water availability, and nutrient cycling. SOM fractions in the active pool, described above, are the main source of energy and nutrients for soil microorganisms, which mediate nutrient cycling in the soil. Biochemically stable SOM participates in aggregate stability and in holding capacity for nutrients and water.

Microaggregates are formed by mineral interactions with iron and aluminum oxides and are generally considered an inherent soil characteristic. They are, however, impacted by current and past management. Fine roots, fungal hyphae, and organic carbon compounds, such as complex sugars (carbohydrates) and proteins (also referred to as glues), bind mineral particles and microaggregates together to form macroaggregates that are still porous enough to allow air, water, and plant roots to move through the soil.