



Animal Manure and Soil Quality

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What is soil?

Soil is a living, dynamic resource that supports plant life. It is made up of different size mineral particles, organic matter, and numerous species of living organisms. Soil provides a physical matrix, chemical environment, and biological setting for water, nutrient, air, and heat exchange for living organisms. It acts as a filter to protect the quality of water, air, and other resources.

What is soil quality?

Soil quality is the fitness of a specific kind of soil to function within its surroundings, support plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation.

How is soil quality important to landowners?

Soil quality enhancement is important to support crop, range, and woodland production and to sustain water supplies. Enhanced soil quality can help to reduce the onsite and offsite costs of soil erosion, improve nutrient use efficiencies, and ensure that the resource is sustained for future use. It is also essential to maintain other resources that depend on the soil, such as water quality, air quality, and wildlife habitat.

How to maintain or improve soil quality?

Soil quality is a complex concept and affected by many factors, but soil organic matter (SOM) is a significant part of soil quality. Soils with

high SOM content are generally considered high quality soils; those with low SOM content are regarded as low quality soils. Therefore, to maintain soil quality is to maintain SOM content.

What is soil organic matter?

Soil organic matter is that fraction of the soil composed of anything that once lived. It includes plant and animal remains in various stages of decomposition, cells and tissues of soil organisms. Organic matter in the soil is lost mostly by microbial decomposition and sometimes by erosion. In Oklahoma, most soils contain less than 1% of SOM, which is considered low. It is necessary to improve our soil quality for a sustainable agriculture.

What does organic matter do?

Organic matter promotes plant growth, regulate the flow of water, and improves soil tilth. Organic matter acts as a storehouse for nutrients, increase the cation exchange capacity, and reduces the effects of compaction. It builds soil structure and increases the infiltration of water. It serves as a buffer against rapid change in pH and serves as an energy source for soil microorganism. SOM also reduces crusting and runoff. Consequently, an increase in the organic matter content of a soil improves its ability to perform.

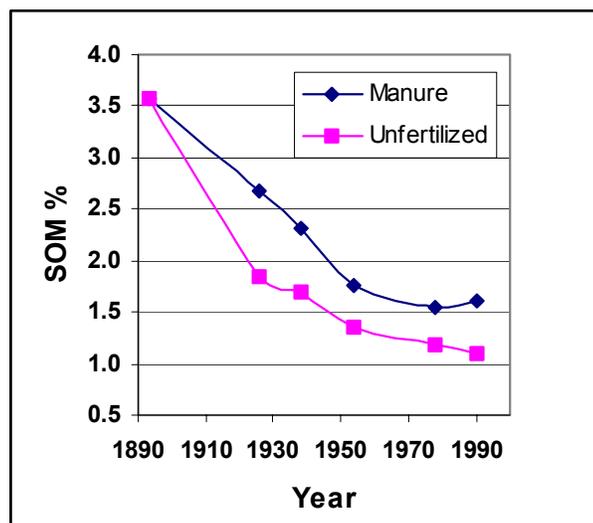
How to increase SOM?

The amount of SOM is controlled by a balance between additions of plant and animal materials and losses by decomposition. Therefore, the effective practices to maintain or increase SOM content are:

1. Increase the production of plant materials by irrigation, fertilization, use of cover crops, restoration of grasslands, etc.
2. Decrease decomposition by reducing or eliminating tillage;
3. Increase supply of organic materials by **applying animal manure** or other carbon-rich wastes, applying plant materials from other areas.

Animal manure, especially solid and slurry manure, contains large amount of organic matter. Continued application of manure can supply plant nutrients and slow down the depletion of SOM as demonstrated by the Magruder Plots in Stillwater.

Overuse of animal manure can result in undesirable salt and nutrients, such as phosphorus, accumulation. Therefore, the application rates of manure should be based on crop nutrient requirement



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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1913, in cooperation with the US Department of Agriculture, Sam E. Curl, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources.

