SARE: Soil Growing Season Fertility Study: Importance of soil organic matter and subsequent effect on growing season fertility.

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Soil organic matter (SOM) is critical for sustaining life on the earth's surface. Without SOM, soils are essentially sterile and will not support plant growth adequate for acceptable pasture and crop production. Soil organic matter contributes to improving soil physical conditions that build soil structure that enhances the soil's ability to collect and hold water essential for plant growth as well as providing a suitable rooting environment for plants. It improves the soil's ability to hold and provide nutrients to plants as well as provides a food source for soil microbial populations. The soil microbes break down plant and animal residues and help fix and/or recycle nutrients such as nitrogen (N), phosphorus (P), and sulfur (S) essential for plant growth (soil health)

In general, soils with low organic matter are low in productivity while soils higher in organic matter are higher in productivity. Much of this productivity is related to the ability of nutrients cycle during the growing season. When soil moisture is adequate, soil microbial activity is closely related to soil temperature. Thus, soil microbes are the most active when the soil temperature is the warmest. This is usually the time of the growing season when plants are growing the fastest and require the most nutrients. Therefore, recycling of SOM is generally highest when the plants need the most nutrients. This, in effect is a synchronization of nutrient availability in the soil and the need of plants, especially N, P, and S.

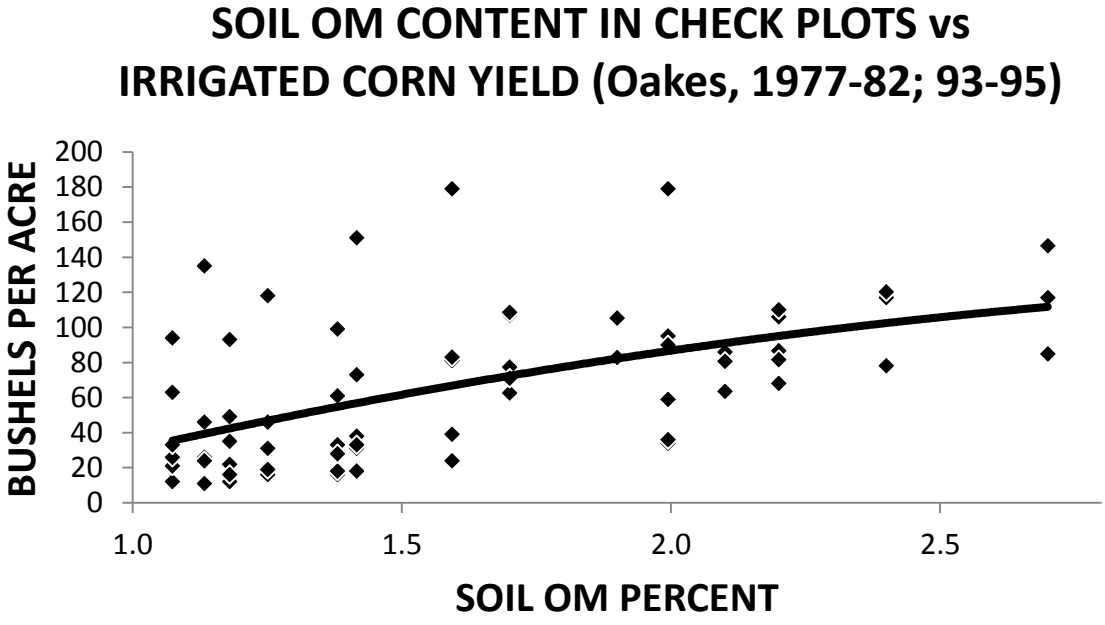

Figure 1. Relationship between SOM and corn yield at Oakes, ND. (Courtesy W. Albus)

Data from the NDSU Oakes Research Site (Figure 1) shows that under the relatively low SOM conditions at that location, a change of 1% in SOM relates to a nearly 49 bu./A change in corn grain yield. Although the environment in western North Dakota is much drier than at Oakes, SOM levels are similar. The effect of SOM levels will be lower in western North Dakota, but still significant, and help reduce the need for additional fertilizer for a crop.

There are three components to SOM: (1) active SOM; (2) slow SOM; and (3) passive OM. The greatest nutrient cycling comes from the active OM component as well as the fresh plant residues that are returned to the soil. Improving soil productivity by increasing SOM helps sustain that productivity and in turn helps maintain SOM.