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This presentation is part of [146: Sustainable Cropping Systems: From Earthworms to Mapping Local Food Capacity](#)

An Integrated Approach to Modeling Multiple Impacts of Cropping System Management.

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Interest in managing soil organic matter (SOM) has been on the increase in recent times because of its direct impact on crop productivity, soil quality and climate change. By converting conventional tillage to more environmentally friendly alternatives which conserve SOM, the agricultural sector can shift from net source to net sinks of organic carbon in soils. However, the emphasis on conservation and environmental issues of tillage adoption may not meet the interests of agricultural producers who are mainly concerned with profitability. The analysis of trade-offs between economic and environmental impacts of alternative tillage practices, therefore, requires a knowledge of interrelationships and feedbacks between economic and soil organic carbon dynamics over time and space. In this study, simulation modeling was employed to estimate the rates of soil carbon sequestration with respect to field parameters that included cropping system, soil type, rotation complexity, tillage, and management practices over a 20-year period in a Minnesota experimental field. Significant variations existed among the parameters simulated. For example, within the same soil type with similar management practices, a 4-year corn-soybean-springwheat/alfalfa-alfalfa rotation enhanced soil C accumulation compared to a two-year rotation of only corn-soybean. Similarly, a well-drained soil tended to sequester more carbon than a poorly drained type. Strip tillage (ST) resulted in more carbon accumulated compared to conventional tillage (CT). Furtherance to the objective of the study, a general modeling framework is being developed to evaluate the effect of cropping system management on the interactions between profitability and SOM across the US.

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