

# EMBRACING THE DIGITAL ENVIRONMENT

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10-13 | San Antonio, Texas

## 240-1 - Soil Carbon Dynamics in Long-Term No-till Based Soybean Experiment in Southern Brazil



Tuesday, November 12, 2019



9:35 AM - 10:05 AM



Henry B. Gonzalez Convention Center - 305

### Abstract

Soybean is the main Brazilian cash crop reaching almost 36 Mha. Many farmers are growing soybean with lack of crop rotation facing problems with soil compaction, low infiltration and poor soil biological activity all related with soil organic carbon (SOC) depletion. Long-term experiments are critical to understand SOC dynamic in different agroecosystems. An experiment under subtropical climate with annual precipitation of 1770 mm and average temperature of 19<sup>o</sup> C was started in 1985 in an Oxisol evaluating a combination of tillage, cover crops and soybean based cropping systems implanted in a depleted SOC land. Tillage systems were conventional (plow + two disk) and no-tillage while cropping systems were: a) monoculture of soybean/wheat (lack of rotation); b) winter crop rotation black oat (cover crop) alternate with wheat and monoculture of soybean (partial rotation); c) winter and summer crop rotation black oat/soybean/wheat/soybean/black oat + common vetch/corn/radish oil/wheat/soybean (full rotation). The above-ground biomass soil input in ascending order was lack, partial and full rotation. For the same crop rotation system, in no-tillage had higher biomass input in relation to conventional tillage. Even though the crop rotation effect was higher than tillage in the quantity of soil biomass input. Eddy-covariance study reported that the carbon balance of a modern soybean cultivar was slight negative. Under conventional tillage even the most complex crop rotation failed in recovery SOC stock. While no-tillage with lack of crop rotation or with partial crop rotation had limited SOC recovery, even

after 27 years. The SOC recovery was increased when the soybean frequency decrease and cover crops and corn frequency were increased in cropping system. The SOC recovery was not restricted to shallow soil layer and was extended to up 1 m elapsed almost three decades. Anyone crop system investigated in this long-term experiment show evidence of carbon saturation when a thicker soil layer was considered.

## authors

[Telmo J. C. Amado](#)

Federal University of Santa Maria

[Charles W. Rice](#)

Kansas State University

[Rodrigo S. Nicoloso](#)

Empresa Brasileira de Pesquisa Agropecuária (Embrapa) / Brazilian Agricultural Research Corporation

[Ademir Oliveira Ferreira](#)

Universidade Federal de Pernambuco

[Jackson Ernani Fiorin](#)

Cooperativa Central Gaucha Ltda

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*Inderjot Chahal<sup>1</sup>, Laura L Van Eerd<sup>1</sup>, David Hooker<sup>2</sup>, Bill Deen<sup>3</sup> and Kenneth Janovicek<sup>3</sup>, (1)School of Environmental Sciences, University of Guelph, Ridgetown, ON, CANADA, (2)University of Guelph, Ridgetown, ON, CANADA, (3)Plant Agriculture, University of Guelph, Guelph, ON, Canada*

### Grain Yield Response to Crop Rotation and Cover Crops in a Long-Term Corn-Soybean-Wheat Rotation Study

**Lindsay Chamberlain**, University of Wisconsin-Madison, Waunakee, WI, **John M Gaska**, University of Wisconsin-Madison, Arlington, WI, **Joseph G. Lauer**, 1575 Linden Drive, University of Wisconsin-Madison, Madison, WI and **Shawn P. Conley**, Department of Agronomy, University of Wisconsin-Madison, Madison, WI

### Simulating Long-Term Maize and Soybean Yields Under Conventional and No-till Systems

**Teerath Rai**, South Dakota, South Dakota State University, Brookings, SD, **Sandeep Kumar**, Rm 248C NPB, Box 2140C, South Dakota State University, Brookings, SD, **Thandiwe M. Nleya**, SNP 245B, Box 2140C, South Dakota State University, Brookings, SD, **Peter J. Sexton**, Department of Agronomy, Horticulture and Plant Science, South Dakota State University, Beresford, SD, **Vakhtang Shelia**, University of Florida, Gainesville, FL and **Gerrit Hoogenboom**, Agricultural & Biological Engineering, University of Florida, Gainesville, FL

### Assessing the Benefits of Cover Crop-Based Organic No-till Practices on Soil Health

**Yichao Rui**<sup>1</sup>, **Jessica Lang**<sup>1</sup>, **Andrew Smith**<sup>1</sup>, **Emmanuel Omondi**<sup>1</sup>, **Matthew D. Ruark**<sup>2</sup>, **Erin M. Silva**<sup>3</sup>, **Kathleen Delate**<sup>4</sup> and **Brian Luck**<sup>5</sup>, (1)Rodale Institute, Kutztown, PA, (2)Soil Science, University of Wisconsin, Madison, WI, (3)1630 Linden Dr, University of Wisconsin-Madison, Madison, WI, (4)Iowa State University, Ames, IA, (5)Biological Systems Engineering, University of Wisconsin-Madison, Madison, WI

### Long-Term Rotation and Tillage Effects on Soil Health Indicators

**Anna M Cates**, Soil, Water, and Climate, University of Minnesota-Twin Cities, Minneapolis, MN, **Matthew D. Ruark**, Soil Science, University of Wisconsin, Madison, WI and **Greg Richardson**, University of Wisconsin - Madison, Madison, WI

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American Society of Agronomy | Crop Science Society of America  
5585 Guilford Road | Madison, WI 53711-5801 | 608-273-8080 | Fax 608-273-2021  
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