

2012 CMDC

Soil Carbon Sequestration in Corn & Soybeans Arkbauer and Scoby

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Introduction

The global atmospheric CO₂ concentration is rising.

Atmospheric Carbon Dioxide Measured at Mauna Loa, Hawaii

The atmospheric concentrations of other radiatively-important trace gases (e.g., N₂O, CH₄) is also rising.

Many scientists are concerned that, due to the greenhouse effect, the global climate is changing. This figure appears on the United States' National Academies website.

Recognizing this fact, as plant scientists, what can we do in the face of potential climate change caused by the greenhouse effect?

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What can we do?

As plant and soil scientists, what can we do?

Increase our understanding of the role plant systems play in the exchange of greenhouse gases between the earth's surface and the atmosphere.

As plant and soil scientists, what can we do?

Quantify surface-atmosphere fluxes of CO₂, CH₄ & N₂O in various agricultural systems.

As plant and soil scientists, what can we do?

Elucidate the influence of relevant biological and environmental controlling factors in regulating these fluxes.

As plant and soil scientists, what can we do?

Ultimately, manage these systems so as to mitigate increasing atmospheric concentrations of trace gases (through, e.g., soil carbon sequestration).

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Carbon Sequestration Research Facility at the UNL Agricultural Research and Development Center, Mead, NE

Landscape-Level Measurements of Carbon Dioxide Exchange

Eddy Covariance Measurements of Carbon Dioxide and Other Fluxes

Measuring Components of Solar Radiation

Close Up of Eddy Covariance Flux Sensors

Initial soil C profiles at CSP site 3, 2001

The amount of residue left in the field has a profound influence on the carbon dioxide flux at the soil surface. So residue management is an important aspect of the carbon cycle in these systems.

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Net Ecosystem Production ($g\ C\ m^{-2}\ d^{-1}$)

Site 1 Irrigated Continuous Maize

Site 2 Irrigated Maize-Soybean Rotation

Site 3 Rainfed Maize-Soybean Rotation

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In fall 2005, due to decreasing yields in the continuous maize site, as well as increasing disease incidence, we changed the management of site 1 from no-till to a single plowing following harvest.



Net Biome Production (NBP) g C m ²	2-year average 2002-2004	2-year average 2004-2006	2-year average 2006-2008	2-year average 2008-2010
Irrigated continuous maize (Site 1)	-51 to -29	-149 to -131	-99 to -82	40 to 51

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