

**“Our work is about understanding systems, specifically the carbon, nitrogen, water and human-social systems that underpin the management of corn-soybean production and their interactive responses to variable climate and weather conditions.”**

Lois Wright Morton,  
Project Director, Climate  
Change, Mitigation, and  
Adaptation in Corn-  
based Cropping Systems  
Coordinated Agricultural  
Project (2011–2016)



## YEAR 4 TOP TEN ACCOMPLISHMENTS...

**Investments in transdisciplinary science** were reflected in the team's Y4 productivity: 59 refereed journal articles, 301 presentations, 26 extension publication and 97 articles referenced our science in popular farm publications. Working groups integrated diverse disciplinary science to more effectively undertake analysis, synthesis, modeling, and publication of findings. Members utilized the team's database spanning 35 field research sites across 8 states. Papers explored regional variations and implications of management practices such as greenhouse gas emissions from artificially drained soils.

**Next-generation scientists** received hands-on experience including research and co-authoring of journal articles. To-date, 103 undergraduate students, 83 graduate students (30% minority and 46% women) and 18 post-doctoral associates (72% minority and 17% women) have been involved with Sustainable Corn. This equates to a total of 2,708 months of experience for this cohort. Our team's current contingent includes 47 graduate students and 10 post-doctoral associates. One outcome from the training of graduate students has been their co-authorship on 19 journal articles to-date which is an important success metric as these students graduate and move into science-based careers.

**The Journal of Soil and Water Conservation** published project findings in a special 2014 issue: *Climate Change and Agriculture*. Project researchers and graduate students authored or contributed to 14 of the 20 papers. These papers highlighted scientific methods, database management and research findings. The scope of research addresses the impact of changes in distribution and timing of precipitation and temperature, farm management practices, human perceptions of vulnerability to and response to climate-induced risk, and effects on crops, surface water and soil. See the Nov/Dec 2014 issue at [jswconline.org](http://jswconline.org).

**A Farmer Statistical Atlas** presented data from a survey of Corn Belt farmers who farm nearly 80% of the region's land. The data are mapped across 22 north central region watersheds, showing variations in farmers' experiences with flooding, saturated soils and drought, their concerns about weather-related risks and confidence in their capacity to manage them, and their perspectives on climate change and potential adaptation and mitigation strategies. Rapid publication of the report at [sustainablecorn.org](http://sustainablecorn.org) has facilitated use of the data by extension educators, scientists, policymakers and media with 11,400 downloads to-date.

**Y4 leveraged dollars** summed to over \$1.8 million, for a total of \$5.3 million leveraged dollars to-date. This includes support from the United Soybean Board, Minnesota Corn Growers Assoc., Iowa Dept. of Agriculture and Land Stewardship, Biological Agriculture Partners; grants from NOAA-SARP, USDA-SARE, USDA-NRCS, Great Plains Climate Hub; and university institutional support. To-date, team members have written 28 proposals and continue to identify additional funding that builds strong partnerships and furthers the team's ambitious goals. Sustainable Corn has allocated more than \$3.8 million and \$1.4 million project dollars to Education and Extension, respectively.

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### Improved predictive power and life cycle analysis papers were published.

One paper shows the predictive accuracy of a biogeochemical model (DAYCENT) is significantly improved when systematically calibrated using the team's biophysical measurements such as soil temperature, N<sub>2</sub>O emissions and crop yield. The addition of a new algorithm to a cropping systems model (SALUS) has improved accounting of changes in soil carbon sequestration due to improved residue management which better quantifies impacts of climate on crop yield. Life cycle models investigating tillage management, nitrogen management, and inclusion of a cover crop were completed.

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### A national conference hosted by Sustainable Corn and the 25x'25 Alliance

was held for Midwest farmers and farm leaders. It drew 189 in-person and 70 online participants from across the U.S. and Canada. Entitled *Resilient Agriculture, Adapting to a Changing Climate*, the conference focused on the science of and ways to increase the resilience of corn-based cropping systems. Participating farmers and crop advisors agreed that region-specific adaptation approaches and proactive planning are necessary to address the short- and long-term impacts of climate change.

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### Project findings were published in *Resilient Agriculture* magazine

for farmers, crop advisors, and other public audiences. This 48-page publication with 21 illustrated articles represents the scope of team members' work on science-based strategies for adapting corn-based production systems to variable climate conditions. It received an Extension Education Materials Award of Excellence by the American Society of Agronomy and can be accessed at [sustainablecorn.org](http://sustainablecorn.org). In addition, traffic on the public website and blog increased 53% in 2014; farmers and crop advisors are the target audience.

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### Partnership with USDA Useful to Useable (U2U)

Project promoted their farmer decision-making tools through Sustainable Corn extension educators. Educators communicated and demonstrated these tools through workshops, meetings, newsletters, and one-on-one conversations. A jointly produced farmer blog, *AgriClimate Connection*, had numerous contributors post timely messages; the blog is one of the most popular hits on [sustainablecorn.org](http://sustainablecorn.org). The Sustainable Corn extension educators have reached over 7,300 individuals in-person this year; and in addition many more were reached through written and electronic media.

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### A national audience of educators

accessed Sustainable Corn expertise through our partnership with the National Council for Science and the Environment (NCSE), which provides climate and agriculture information via a free, multimedia resource website for educators: Climate Adaptation and Mitigation E-Learning (CAMEL) at [camelclimatechange.org](http://camelclimatechange.org). Sustainable Corn fact sheets and videos are posted and available to 838 educators/CAMEL members. Evaluation from science and agriculture teachers attending project-related summer climate camps showed increased confidence and willingness to incorporate agriculture and climate into their curriculum.

## PROJECT GOALS

**CARBON:** Increase the retention of soil carbon to improve soil quality and sustainability within corn-based cropping systems.

**NITROGEN:** Limit the loss of nitrogen during seasonal peaks observed within Midwestern corn-based cropping systems that have naturally rich soils and fertilizer applied.

**WATER:** Stabilize soil and nutrients during periods of saturated and flooded conditions while improving water availability and efficiency for crop use during moisture stress conditions.

**SYSTEMS:** Build system resilience by integrating productivity and environmental goals through field, farm, watershed and landscape level management in the face of changing climate.

**STAKEHOLDERS:** Transfer knowledge and findings through science-driven, experiential learning opportunities to equip and educate farmers and teachers.

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