



## YEAR ONE: TOP 10 ACCOMPLISHMENTS

- 1. Transdisciplinary<sup>1</sup> science.** Established a 136-person team of scientists, graduate students and topic-based specialists across more than 19 disciplines.
- 2. Research network of 26 field sites across 8 states.** Established an expansive network with 55 treatments and 80 types of measurements collected to measure the carbon (C), nitrogen (N) and water footprints of corn-based cropping systems. These treatments include a suite of management practices, including extended crop rotations, cover crops integrated into corn-soybean systems, tillage, drainage water management, nitrogen application timing and landscape position.
- 3. Standardized methodologies and metrics.** Created and implemented uniform, standardized methodologies for gathering field data across the 26 sites on soil organic carbon, total nitrogen, soil physical properties, water quality and volume, greenhouse gas, crop biomass, C and N in biomass and grain, insect and disease pressure and grain yields.
- 4. Central database.** Developed the framework and constructed the team's centralized, Web-based repository to store and manage research data from the field research network, farmer survey, and secondary data sets on climate and metadata for analyses and synthesis.
- 5. Survey of nearly 20,000 farmers in top 22 corn-producing HUC6<sup>2</sup> watersheds in the upper Midwest.** Developed the methodology and instrument to assess farmers' social and economic beliefs, concerns, and management practices; mailed to a stratified, random sample in February 2012.
- 6. Extension partnerships: 10 Land Grant Universities and 20 dedicated extension educators.** Established and strengthened climate science and agriculture extension plans of work through the recruitment and orientation of extension educators who will establish bridges and create learning opportunities between the project team and more than 200 participating farmers.
- 7. Next generation scientists.** Recruited and trained 35 graduate students to perform research, extension and education work across all project objectives.
- 8. Education curriculum.** Recruited and hired staff to work with high school science teachers to create science and agriculture modules for classroom, outdoor camps and informal learning experiences.
- 9. Internal and external communication.** Created collaborative tools, guidelines and standards for team use, and housed them on the CSCAP internal Web site. Developed external Web site for communicating team progress to the public ([www.sustainablecorn.org](http://www.sustainablecorn.org)).
- 10. Leveraged dollars and personnel resources totaling more than \$730,000<sup>3</sup>.** Built collaborations and partnerships with other USDA projects, and leveraged project dollars to obtain additional funds to support research, extension and education.

## PARTNERS

A partnership among Iowa State University; Lincoln University; Michigan State University; The Ohio State University; Purdue University; South Dakota State University; University of Illinois; University of Minnesota; University of Missouri; University of Wisconsin; and USDAARS – Columbus, Ohio.

## DISCIPLINES

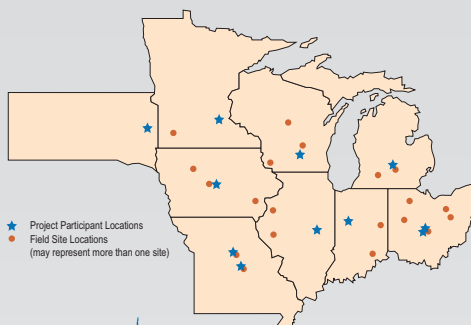
This project involves scientists from disciplines including agricultural education, agricultural engineering, agronomy, climatology, crop and systems modeling, crop sciences, economics, extension education, integrated pest management, natural resources, soil sciences and sociology.

## DURATION

2011-2016

## OBJECTIVES

1. Develop standardized methodologies and perform baseline monitoring of carbon, nitrogen and water footprints at agricultural test sites across the Midwest.
2. Evaluate how crop management practices impact carbon, nitrogen and water footprints at test sites.
3. Apply models to research data and climate scenarios to identify impacts and outcomes that could affect the sustainability and economic vitality of corn-based cropping systems.
4. Gain knowledge of farmer beliefs and concerns about climate change, attitudes toward adaptive and mitigative strategies and practices, and decision support needs to inform the development of tools and practices that support long-term sustainability of crop production.
5. Promote extension, outreach and stakeholder learning and participation across all aspects of the program.
6. Train the next generation of scientists, develop science education curricula and promote learning opportunities for high school teachers and students.



## THE CHALLENGE

Drought. Flooding. Extreme spring precipitation and humidity. Prolonged high temperatures. Shifting frost dates. Increased disease and pest pressures. **U.S. agriculture is increasingly impacted by the effects of a changing climate.** Recent and projected changes in the volatility and timing of weather events and conditions underscore the urgent need for systematically addressing agricultural vulnerability, risks and adaptation strategies.

Corn is the major cereal crop in the United States, which along with rice, soybean and wheat provides 75 percent of the calories the world consumes. More than 70 percent of the U.S. corn crop is produced in the nine Midwestern states represented by the CSCAP. Climate scientists agree that long-term weather patterns will continue to change; however, **there is great uncertainty and little research regarding how these global climate changes will impact local and regional cropping systems.**

**Research on the sustainability and resilience of corn-based cropping systems and farmers' willingness and capacity to adapt to a changing climate is necessary** to answer the complex and difficult questions this challenge poses. Farmers must be empowered to implement adaptive management strategies that sustain long-term productivity.

## THE VISION

The project envisions a region-wide coordinated functional network developing **science-based knowledge that addresses climate mitigation and adaptation, informs policy development, and guides on-farm, watershed level and public decision making** in corn-based cropping systems.

<sup>1</sup> A transdisciplinary project integrates the knowledge of many specializations to make a quantum leap beyond disciplinary sciences to create new collaborative knowledge, leading to new understanding of difficult and complex problems.

<sup>2</sup> U.S. watersheds are classified by a system of Hydrologic Unit Codes (HUCs) which are nested in successively smaller hydrologic units. There are 21 HUC2, 22 HUC4 and 352 HUC6 level watersheds.

<sup>3</sup> \$731,685 in additional year one funds come from: Iowa Natural Resources Conservation Service (\$17,000), Iowa State Experiment Station (\$17,200), Purdue Agriculture (\$17,200), United Soybean Board (\$80,285), and supplemental institutional support (more than \$600,000).

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