THE OHIO STATE UNIVERSITY
SCHOOL OF
Environment and Natural Resources
Impact Statement

Climate Change and Corn Systems in the Corn Belt

SUMMARY

A USDA AFRI grant titled "Climate change, mitigation, and adaptation in corn based cropping systems" planned between 2011 and 2016 will create a benchmark for greenhouse gas emission from corn fields and rates of carbon sequestration using standardized methodology across the Corn Belt. Farmers will be surveyed about their knowledge and attitude regarding climate change and willingness to implement strategies to cope with it. Farmers will become better prepared with strategies to deal with climate change.

SITUATION

Corn is a high value commodity in America. The highly versatile crop is an economic powerhouse, employing millions and producing food, feed and fuel. American farmers heavily invest their time, land and money in the crop's production: In 2011, 12.3 billion bushels of corn were produced in the United States alone with a price per bushel ranging between $5-6.

Global and domestic demand for corn continues to rise. However, there is increasing uncertainty about how long-term US climate trends are impacting corn-based cropping systems and threatening agricultural investments. In response, farmers are seeking new ways to ensure continued crop productivity while also minimizing environmental impact.

RESPONSE

OSU (Drs. Richard Moore, Rattan Lal, Warren Dick and Kristi Lekies) are involved in four of the six objectives in the grant. Dr. Lal leads the objective to measure GHG in corn and soybean fields and Dr. Dick has been focusing on the corn-soybean no-till rotations. Dr. Moore leads the education objective and also supervises a 0.5 FTE extension position who works with farmers in Sugar Creek to interview them about corn and do on-farm testing. Dr. Lekies conducts evaluation. We are part of this five-year project which gathers data from 26 field sites in eight Midwestern states and focuses on ways to best promote the long-term sustainability and productivity of the corn-based cropping system. We work as part of a transdisciplinary team assessing the environmental, economic and social impacts of shifting weather patterns and increasing long-term climate variability on the system. Extension and education programs are working with farmers, teachers and students to connect them with project analyses and promote collaborative learning.

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IMPACT

US corn production is at risk under assumptions of climate change. The transdisciplinary grant team has grown to 136-person team of scientists, graduate students and topic-based specialists across more than 19 disciplines. We are part of a research network of 26 field sites across eight Midwestern states that has 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. We have developed standardized methodologies and metrics and created and implemented uniform, standardized methodologies for gathering field data across the Ohio 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. We are using the same survey with 20 Sugar Creek farmer group that was sent out to nearly 20,000 farmers in top 22 corn-producing HUC6 watersheds in the upper Midwest. The curriculum specialist hired by Dr. Moore has 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.

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