Meeting: Project aims to predict yield potential to help global food security

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Resolving the debate over how best to feed a growing global population requires basic information about current and potential yields at local levels around the world, a University of Nebraska-Lincoln agronomist said.

"We need to have a much finer ability to predict the productive capacity of every hectare of land and its water efficiency. It's fundamental to being able to prioritize the research agenda for agriculture and to determine what form agriculture should take," said Ken Cassman, Robert B. Daugherty Professor of Agronomy at UNL.

Cassman, who also chairs the Independent Science and Partnership Council of the Consultative Group on International Agricultural Research, spoke during the "Alternative Paths to Food Security: Making the Right Choices While Feeding the World" symposium Sunday (Feb. 17) at the 2013 Annual Meeting of the American Association for the Advancement of Science in Boston.

"We were successful in the first Green Revolution precisely because there was such a strong consensus," he said. "Everyone understood that we were running out of food and the magnitude of the problem. That's missing today because there aren't robust data and scientific consensus about how much food can be produced on existing farmland, and from that, where and how to increase production."

To provide that foundational data, Cassman and an international research

team are developing the Global Yield Gap Atlas, a tool to estimate food production capacity and the gap between current and potential farm yields on every hectare of existing farmland using the best available science and data.

Unlike other efforts to estimate yield potential, the atlas uses a bottom-up approach. Working with colleagues at Wageningen University in the Netherlands, the team is recruiting agronomists worldwide to identify key agricultural areas and collect data about local conditions and farming methods.

These data are then scaled to national, regional and global levels.

Researchers also are developing the necessary methodologies, such as accurately converting short-term weather data into long-term patterns and scaling up local yield estimates.

Detailed yield gap information will help reconcile widely differing views over how agriculture will feed the 9 billion people expected to populate the planet by 2050, Cassman said.

Some people advocate organic or regionally based production systems, arguing that reliance on a few major crops and cropping systems is unsustainable and environmentally destructive. Others believe that modifying current systems through incremental scientific innovations would suffice and that alternative systems are inefficient and would require destroying rain forests and grasslands to increase production.

Cassman said that if global analysis of food production potential indicates it will be possible to meet food production demands on existing farmland, it would provide justification for alternative crops and cropping systems, which require considerable time and effort to develop. In contrast, if the global analysis indicates a tight race to meet future

demand on existing cropland, the incremental approach to improve current crops and cropping systems would gain sway because there would be little margin for error.

In both cases, Cassman said, the answer won't be one-size-fits-all: some areas are best suited to intensive, high-yield systems, while other locations' soil and climate favor less intensive "alternative" farming methods.

Countries must look ahead to 2050 and determine if they have the potential to self-sufficiently feed their people, he said. If not, they must adopt an effective agricultural strategy based on a fundamental understanding of their productive capacity, including knowing where they can obtain additional food through trade with other countries.

With adequate funding, the Global Yield Gap Atlas will help answer those questions within three to four years. The team received a $2 million grant from the Bill & Melinda Gates Foundation to work in India, Bangladesh and 10 Sub-Saharan African countries. The University of Nebraska's Robert B. Daugherty Institute funds collaborations in Brazil and Argentina.

"If we're serious about helping to resolve this debate, we must have certain information, basic information. Otherwise, the debate goes on ad infinitum," Cassman said. "Obviously, we'll never eliminate all of the disagreements, but what (the atlas) will do is help focus the debate on a more defendable set of assumptions about potential supply to meet the estimated demand, where it can be produced and the variability of that production."

  More information: All information and methodologies are shared on the new public website www.yieldgap.org

Provided by University of Nebraska-Lincoln

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