C-Quest 2016:
Charting a Course for Climate Research in Agriculture

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ILSI Research Foundation Brings Together Expert Scientists and Farmers To Prioritize Top Research Needs for US Agriculture

C-Quest Presenters

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There is a growing demand for more nutritious food and for the United States agri-food system to become carbon-neutral. New research suggests these goals are achievable with farming practices that enhance soil health and increase levels of soil carbon. However, important questions still need to be answered, such as the permanence of soil carbon reserves and how to best validate emerging soil carbon protocols. It is essential that the new research agenda for US agriculture includes targets that address such critical information gaps.

It was against this backdrop, and as part of its mission to advance science to address real world problems, that the ILSI Research Foundation organized C-Quest: Charting a Course for Climate Research in Agriculture on 24-25 October 2016 at Washington University in St. Louis. Eighty scientists, farmers, and other experts attended C-Quest, with the shared goal of developing a prioritized set of research targets for US agriculture that:

- Support achievement of USDA's building blocks for climate smart agriculture;
- Integrate existing US field research networks for climate adaptation;
- Develop a research agenda to achieve a carbon-neutral agri-food system in the US through a focus on soil carbon and soil health, including validation of soil carbon protocols.

C-Quest was co-sponsored by the Foundation for Food and Agriculture Research, the Howard G. Buffett Foundation, Monsanto Company, Soil Health Partnership, USDA, Washington University in St. Louis and the Sustainable Agriculture Research and Education (SARE) program at the University of Missouri. The ILSI Research Foundation took a multi-sectoral, collaborative approach to planning this workshop, by ensuring the C-Quest organizational committee included representatives from the sponsorship groups as well as Field to Market, North American Climate Smart Agriculture Alliance, The Nature Conservancy, and World Wildlife Fund.

> *"C-Quest is helping agriculture take a bold step forward. It's very encouraging to see this broad group of expert scientists and farmers engage in dialogue, establish common understanding and prioritize new research ideas." -Dr. Barbara Schaal, Washington University in St. Louis*

A briefing document was circulated to all workshop participants two weeks before C-Quest convened to establish a baseline understanding about climate research in agriculture. The workshop format included plenary presentations to establish a common level of understanding for

all participants and describe the workshop deliverables. Most of the workshop was spent in breakout groups, where individuals were given ample time to collectively brainstorm research targets on Monday and then prioritize these new ideas on Tuesday. A final plenary session was used to share and further refine ideas, which were then voted upon by the entire group using polling software.

Plenary Highlights

"We must collaborate across sciences and with other disciplines to achieve sustainability." -Dr. Charles Rice, Kansas State University

The keynote presentation was provided by Dr. Charles (Chuck) Rice, Kansas State University, who highlighted the climate research challenge for US agriculture, emphasizing the importance of soil health, plant and animal breeding, precision agriculture, modeling, weather forecasting, and risk management.

"Through the Building Blocks for Climate Smart Agriculture, the USDA is committing to reduce greenhouse gas emissions and increasing carbon stored in forests and soils by over 120 million metric tons of carbon dioxide equivalent per year by 2025. That amount is equivalent of taking 25 million cars off the road, or offsetting the emissions produced by powering nearly 11 million homes." -Dr. Bill Hohenstein, USDA

Breakout Sessions

Discussions were advanced in breakout sessions where participants first brainstormed and then prioritized relevant research topics across nine areas: Soil Health, Nitrogen Stewardship, Livestock Partnerships, Land Conservation, Grazing and Pasture Lands, Integrate Field Research Networks, Grower Adoption of C-Neutral Practices, C-Neutral Modeling and Verification, and Pollinator Health.

The top priority identified by the participants focused on developing reliable indicators for quantifying soil health. This reflects the surging commercial and research interest in promoting robust soil microbial communities, improving cover crop cultivars, and characterizing soil health-related ecosystem services. Other highly ranked research targets included the effectiveness of practices, equipment, and products for nitrogen stewardship, as well as the use of soil health indicators to help drive grower adoption of carbon-neutral farming practices. A common theme that emerged from all the C-Quest discussions is that growers will respond in positive ways when given access to reliable data on practices that are profitable and achieve better, long-term outcomes.

A report about C-Quest, summarizing all findings, will be published by the ILSI Research Foundation and distributed broadly to help inform research and investment strategies. To view the presentations and briefing document from this workshop, please visit: *http://bit.ly/ILSIRF_CQuest2016.*

Top Research Targets Identified for US Agriculture

C-Quest participants prioritized the following research targets to support USDA's climate smart agriculture initiative, integrate existing US field research networks, and achieve a carbon-neutral agri-food system in the United States. In priority order:

1. *Soil Health: Development of Quantitative Indicators*
2. *Nitrogen Stewardship: Effectives of Practices, Equipment & Products*
3. *Grower Adoption of C-Neutral Practices: Quantifying and Regionalizing Soil Health Metrics to Better Define Soil Health*
4. *C-Neutral Modeling & Verification: Verification & Evaluation of Practices & Systems*
5. *Land Conversation: Quantitative Maps of Regional Sequestration Opportunities*
6. *Livestock Partnerships: Better Understanding of Effectiveness of Current Practices on Enteric Emissions and Manure Management*
7. *Pollinator Health: How/When can other Ecosystem Services/Co-benefits Be Used*
8. *Integrating Field Research Networks: Improve Communication among Existing Networks*
9. *Grazing & Pasture Lands: Life Cycle Assessment of Grazing & Pasture Systems*

The ILSI Research Foundation improves environmental sustainability and human health by advancing science to address real world problems.

The ILSI Research Foundation's programs in nutrition, toxicology, risk assessment and agriculture are informed and strengthened by the deliberate inclusion of international, multi-sectoral expertise and perspectives.

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