

## OBJECTIVES 4 & 5

### Topic Area: Social-economic and Extension

**AS PER PROPOSAL:** *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 and adoption of tools and practices that support long-term sustainability of crop production. Contribute to feedback loops between social science research, biophysical field research, monitoring, and modeling of agricultural production systems.*

**SYNOPSIS:** These objectives focus on farmer capacity and willingness to adopt management practices and strategies that lead to long-term sustainability and productivity of corn-based cropping systems under variable weather and long-term climate changes. Objective 4 will collect and analyze data on Midwestern farmers' beliefs and concerns about climate change, current management strategies, awareness and use of decision tools and innovative practices, and the relationships between these variables and farmer willingness and capacity to pursue adaptive and mitigative actions. Findings from Objective 4 will inform the development of extension programming, tools for farmer decision-making, and education curricula under Objectives 5 and 6. Findings will also inform a feedback loop to the field trials and modeling objectives and science-based policies. These objectives will be attained in close partnership with the standard CAP grant "Useful to Useable (U2U)."

### RESEARCH QUESTIONS AND HYPOTHESES SPECIFIC TO CSCAP

Project Leads: Arbuckle, Benning, Tyndall, Wright Morton, Knoot

**RQ 1. To what degree do farmers perceive climate change as a threat to their livelihoods, and how do those attitudes impact their willingness to adopt or otherwise support adaptation strategies and practices?**

*Hypothesis 1a:* Belief in climate change and concern about its impacts will be associated with willingness to adopt adaptive strategies and practices.

*Hypothesis 1b:* Recent experience of extreme weather and its impacts will be associated with willingness to adopt adaptive strategies and practices.

*Hypothesis 1c:* Confidence in current risk-management and resilience-enhancing practices and strategies will mediate willingness to adopt further adaptive management.

**RQ 2. To what degree do farmers implicate human activities as drivers of climate change, and how do those beliefs impact their willingness to adopt or otherwise support mitigation strategies?**

*Hypothesis:* Beliefs about the causes of climate change (e.g., human vs. natural) will influence willingness to adopt or support mitigation strategies and practices.

**RQ 3. What weather-related decision tools do farmers employ, and how is use related to climate change preparedness/adaptive management?**

*Hypothesis:* Farmer use of weather-related decision tools will be associated with use of resilience-enhancing strategies and practices.

**RQ 4. What other human dimensions factors (e.g., institutional, economic, or cultural influences, knowledge of practices/strategies) act as barriers to or facilitators of more resilient corn-based systems?**

*Hypothesis 4a:* Farmer location on a cultural identity/orientation continuum between stewardship and productivism will determine willingness to adopt or support different types of adaptive strategies and practices (e.g., in-field productivity maintenance vs. edge-of-field water quality protection).

*Hypothesis 4b:* Farmer knowledge of innovative adaptive and mitigative practices and strategies will mediate their use.

*Hypothesis 4c:* Relative importance of key conservation and productivist actors in agricultural social networks will mediate attitudes toward adaptation and mitigation.

*Hypothesis 4d:* Land tenure arrangements will impact farmers' willingness and perceived ability to adopt adaptive and mitigative practices and strategies.

**RQ 5. How do climatological, meteorological, and biophysical factors shape farmer behavior toward climate change and potential adaptive and mitigative actions?**

*Hypothesis 5a:* Perceptions of climate change risk will vary with experience with climatological and meteorological conditions (i.e., extreme weather).

*Hypothesis 5b:* Perceptions of climate change risk will vary with biophysical factors (i.e., farmland characteristics, presence of waterways).

**RQ 6. How do farmers accommodate climate change in their decision making processes, and what tools and materials should be developed to help them establish more resilient systems? (To be explored through in-depth I-Farm interviews.)**

**RQ 7. To what extent do farmer-led discussion groups in combination with the use of performance-based measures facilitate improvements in soil condition and reductions in soil and nutrient loss to proximate water bodies in corn-based cropping systems?**

*Hypothesis 5a:* Farmer led group interactions and relationships increase learning and understanding of climate impacts on their cropping systems and their watershed.

*Hypothesis 5b:* Farmer led groups utilizing the performance-based management process (IFARM, stalk N tests, SCI) will be more likely to identify and use risk assessment strategies at the farm and watershed levels to adapt to changing climate conditions than farmers not engaged in the group process or exposed to performance-based tools.

**RESEARCH QUESTIONS AND HYPOTHESES SHARED WITH U2U**

Project Leads: Wright Morton, McGuire (Graduate Student), Wilke (Graduate Student)

**RQ 8. To what extent is there a disconnect between scientific climate change information and subsequent response from farmers in developing agriculture risk management portfolios? What are the sources of these disconnects?**

**RQ 9. How do scientific groups, such as climatologists, perceive long-term risks and benefits associated with climate change, and how does this differ from "layperson" or farmer groups? How does this contrast with perceptions of change anticipated in the next 2 or 5 years?**

**RQ 10. What are sources of these differences in perception regarding the issue of climate change between these two groups?**

**RQ 11. How does a farmer's individual identity influence farm management decisions under variable weather conditions?**

*Hypothesis:* The more dominant a farmer's conservationist identity is within his/her individual identity, the more likely he/she will adopt practices that reduce the negative impact of severe weather events.

**RQ 12. How does a farmer's social identity influence farm management decisions under variable weather conditions?**

*Hypothesis 12a:* The more dominant a farmer's conservationist identity is within his/her social identity, the more likely he/she will adopt practices that manage for both profitability and minimization of environmental impact when adapting to OR mitigating for climate change.

*Hypothesis 12b:* The more dominant a farmer's conservationist identity is within his/her social identity, the more likely he/she will adopt practices that adapt to or mitigate for the impact of drought.

*Hypothesis 12c:* The more dominant a farmer's conservationist identity is within his/her social identity, the more likely he/she will adopt practices that adapt to or mitigate for the impact of extreme weather events (soil erosion and nutrient loss).

*Hypothesis 12d:* The more dominant a farmer's conservationist identity is within his/her social identity, the more likely he/she will adopt practices that put long-term conservation of farm resources before short-term profits when adapting or mitigating for climate change.

**RQ 13: How does a farmer's role identity influence farm management decisions under variable weather conditions?**

*Hypothesis:* The more dominant a farmer's conservationist identity is within his/her role identity, the more likely he/she will adopt practices that reduce the negative impact of severe weather events on productivity and conservation practices.