

Climate Change Beliefs, Perceived Risk, and Support for Adaptation and Mitigation among Corn Belt Farmers: Preliminary Survey Results

J. G. Arbuckle Jr.¹, John Tyndall², and Lois Wright Morton
Iowa State University

Introduction

Agriculture is both vulnerable to global climate change and a significant source of the greenhouse gases (GHGs) that are driving climate shifts (Beddington et al. 2012; IPCC 2007). Because climate change-related threats to agriculture also represent threats to society, calls for adaptation and mitigation are increasingly common (e.g., Howden et al. 2007; McCarl 2010). Natural hazards research finds that adaptation and mitigation behavior depends in large part on perceptions of the risks associated with a given natural hazard, and perceived risk is mediated by beliefs about the existence of the hazard and its characteristics (Nigg and Mileti 2002). However, although beliefs form the cognitive basis for behavior, they may not be accurate or scientifically based (Weber and Stern 2011). Public understanding and risk perceptions regarding climate change are particularly unsettled, with beliefs about the phenomenon varying widely among different population segments (Maibach et al. 2009).

CSCAP Objective 4: Social Science Research

The objectives of the Climate Change, Mitigation, and Adaptation in Corn-Based Cropping Systems (CSCAP) social science research component are to 1) assess farmer understanding of climate change and attitudes toward adaptive and mitigative practices and strategies, 2) contribute to the development of feedback loops between biophysical field research, monitoring, modeling of agricultural production systems, social science research, and education, extension and outreach activities, and 3) inform the development of policy and programming to encourage the adoption of appropriate systems across the region. Toward these ends, a survey of Corn Belt farmers was conducted in February and March 2012.

The objectives of the survey research were: 1) to understand farmer beliefs and risk perceptions regarding climate change and how those beliefs and attitudes relate to support for appropriate adaptation and mitigation strategies, and 2) learn about current farm management strategies, including conservation practices, use of weather-related decision support tools, and timing of decisions and actions such as fertilizer application. These data will help to inform policy and programming aimed at enhancing cropping system resilience.

Through a partnership with the NIFA-funded *Useful to Usable (U2U) project*, a survey of Corn Belt farmers with a minimum of 80 acres of corn and \$100,000 of gross farm income was conducted. The farmer sample was stratified by 22 HUC6 watersheds comprising ~60% of all US corn acreage (Fig. 1). A total of 4,778 farmers responded to the survey, for a response rate of 26%.

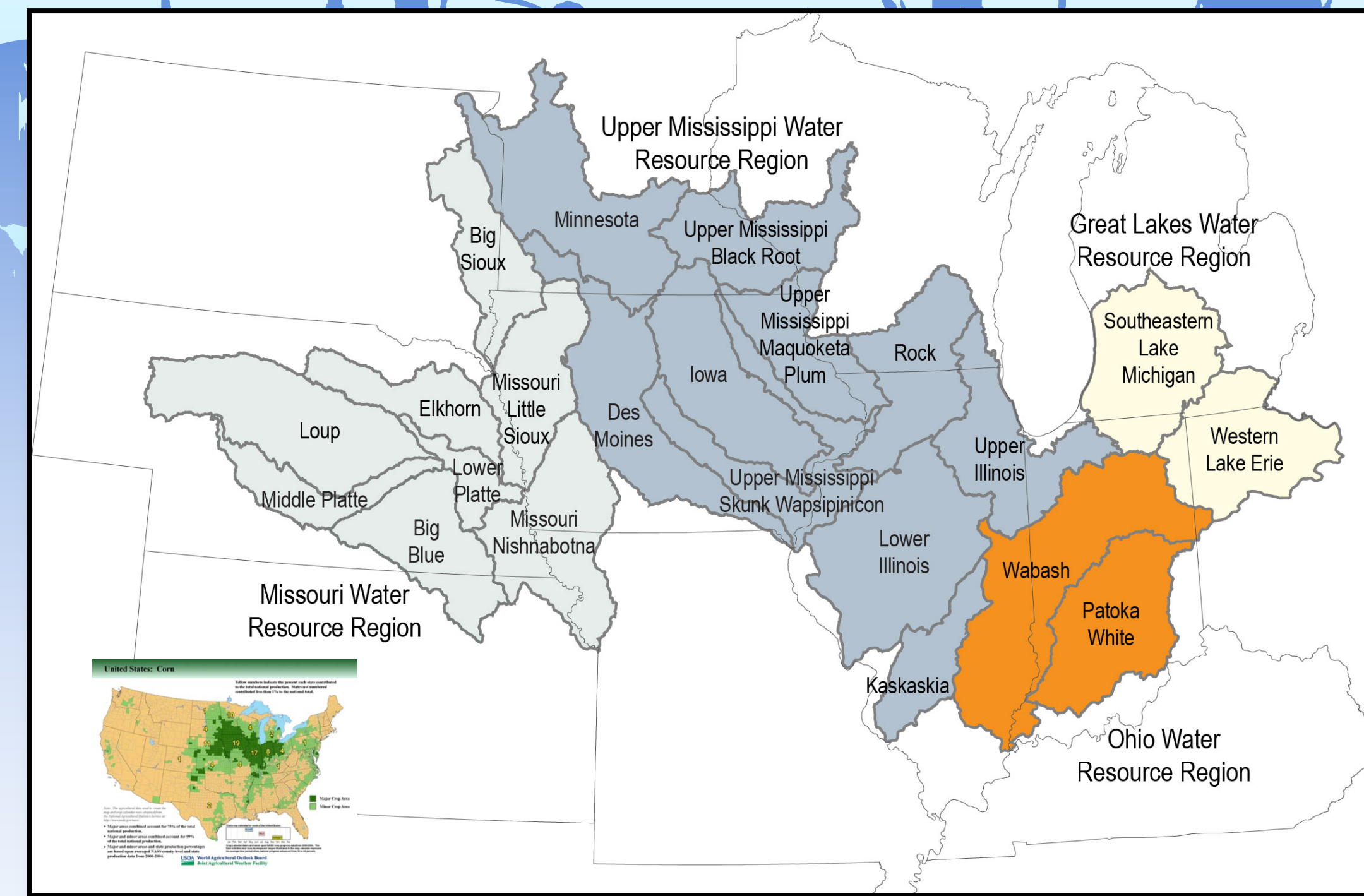


Figure 1. Twenty-two surveyed watersheds.

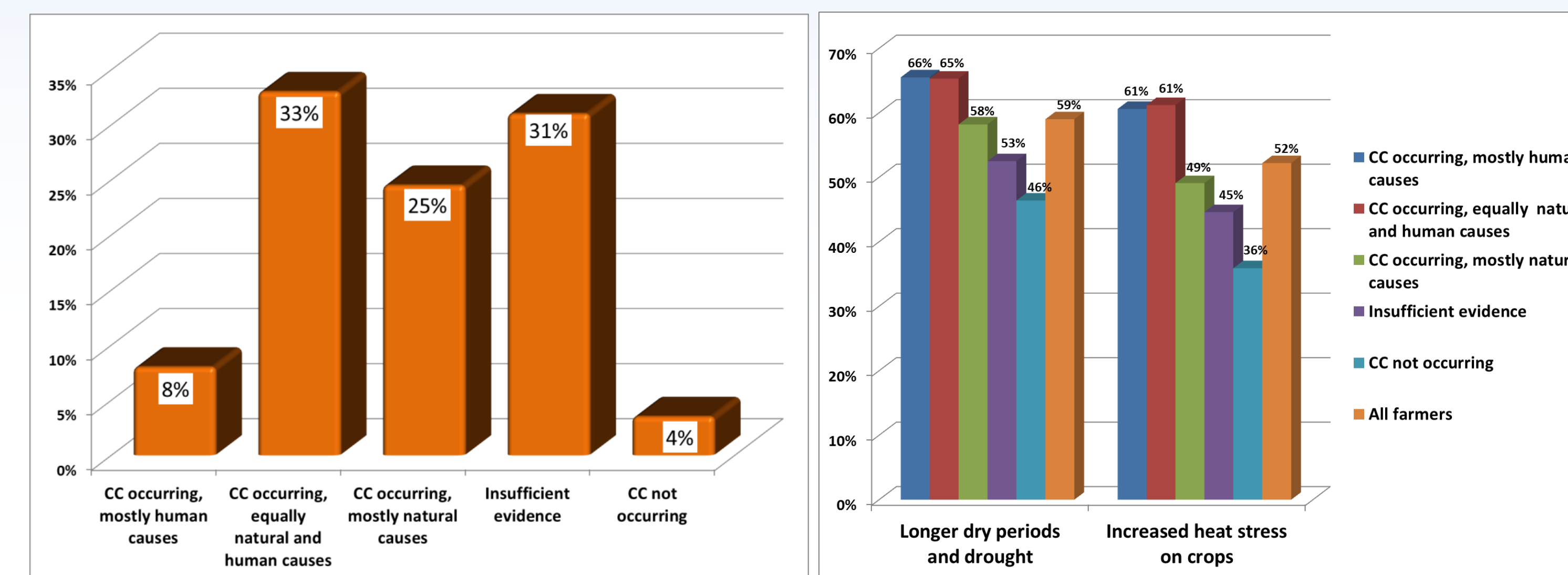


Figure 2. Percent distribution: Beliefs about climate change

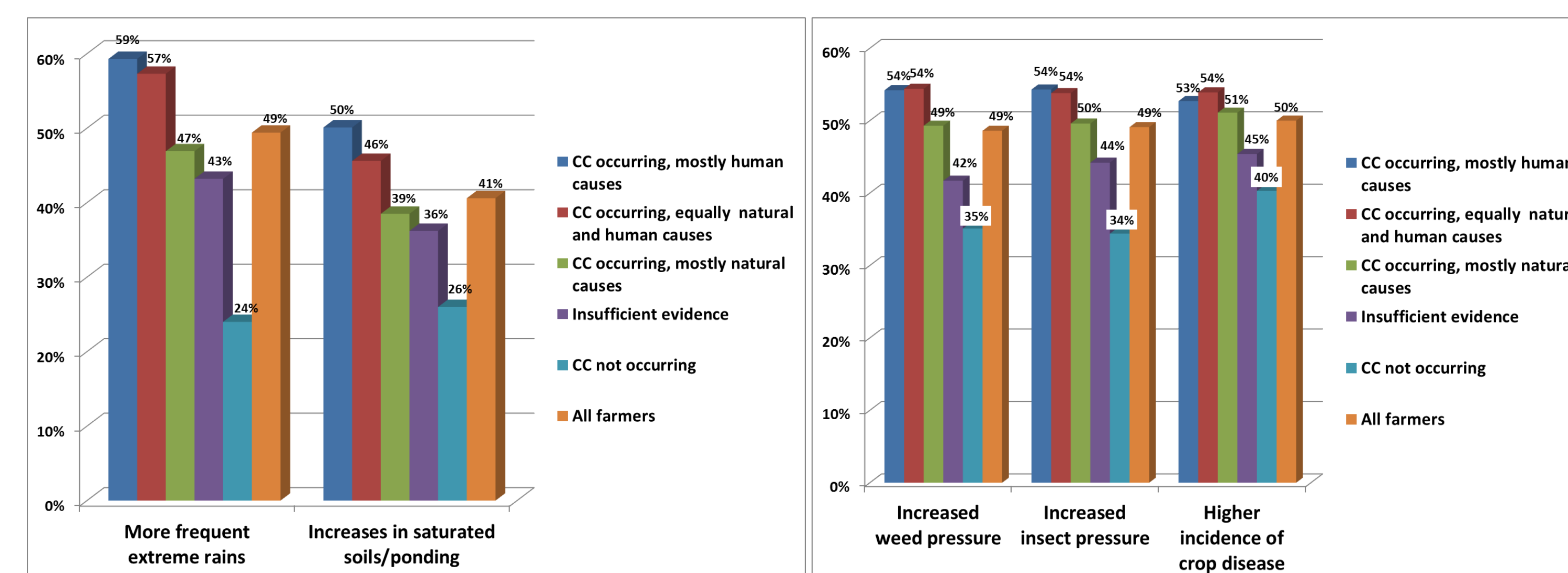


Figure 3. Percent concerned or very concerned about drought and heat

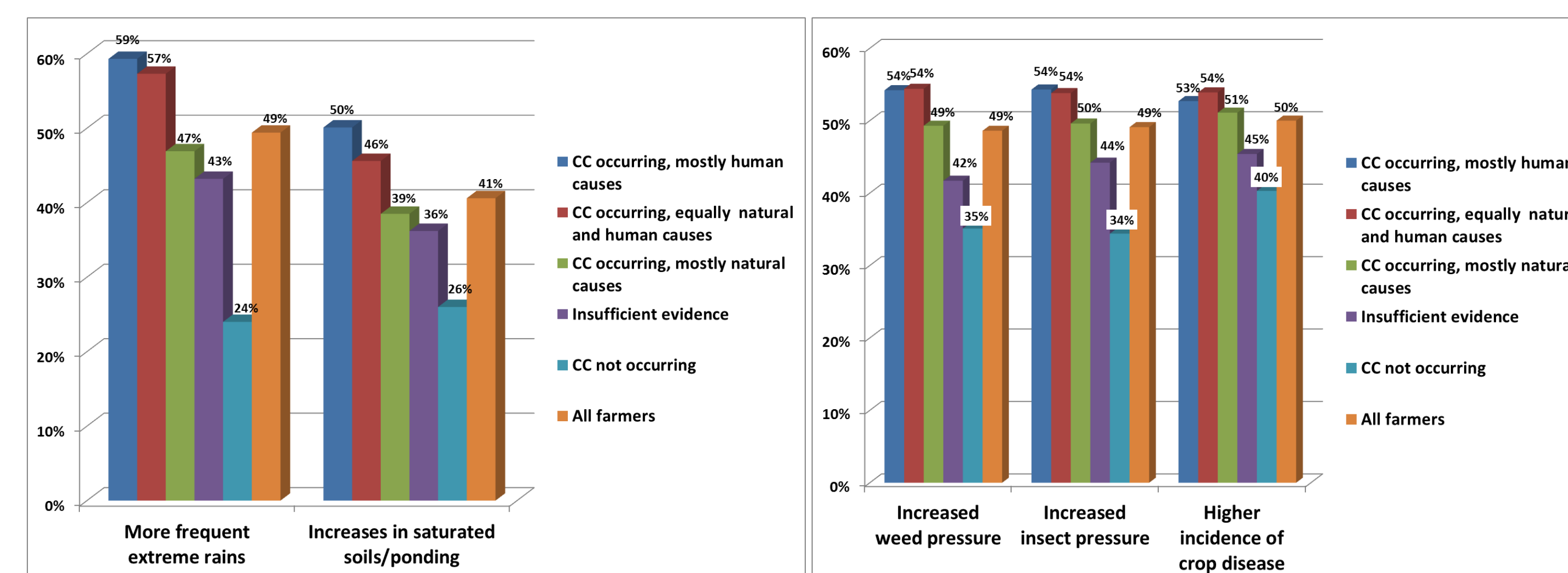


Figure 4. Percent concerned or very concerned about excess water

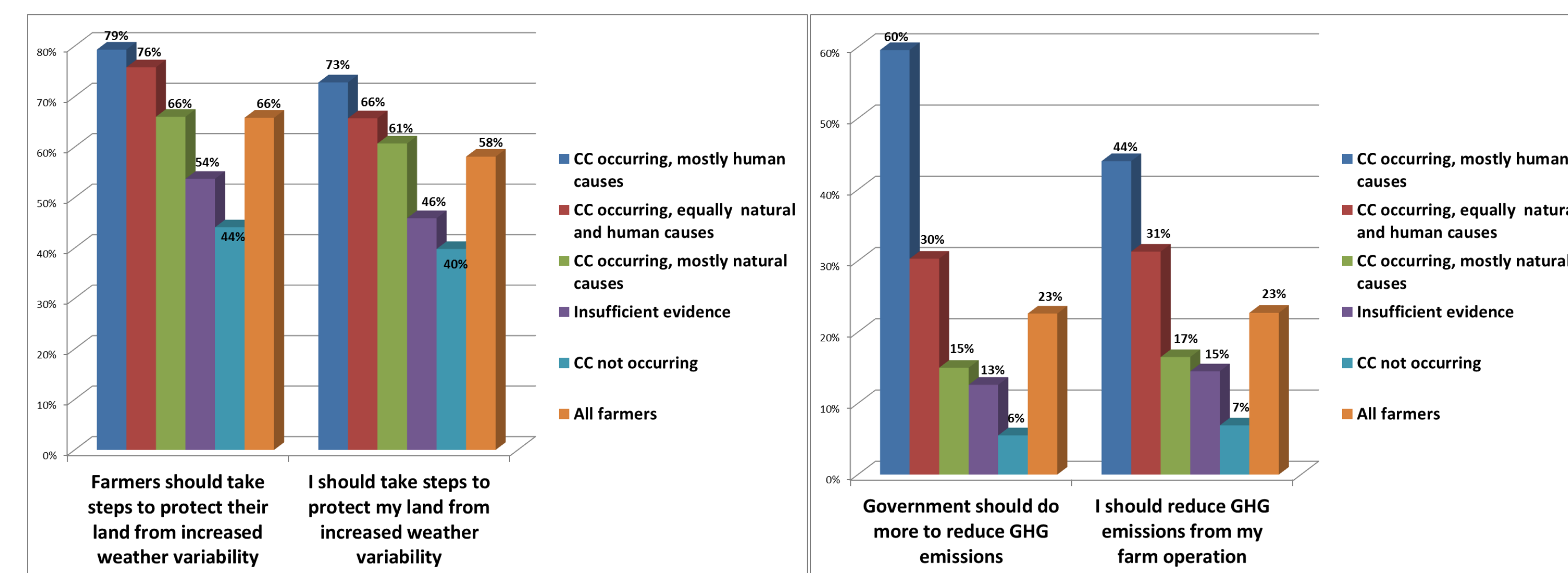


Figure 5. Percent concerned or very concerned about pests and disease

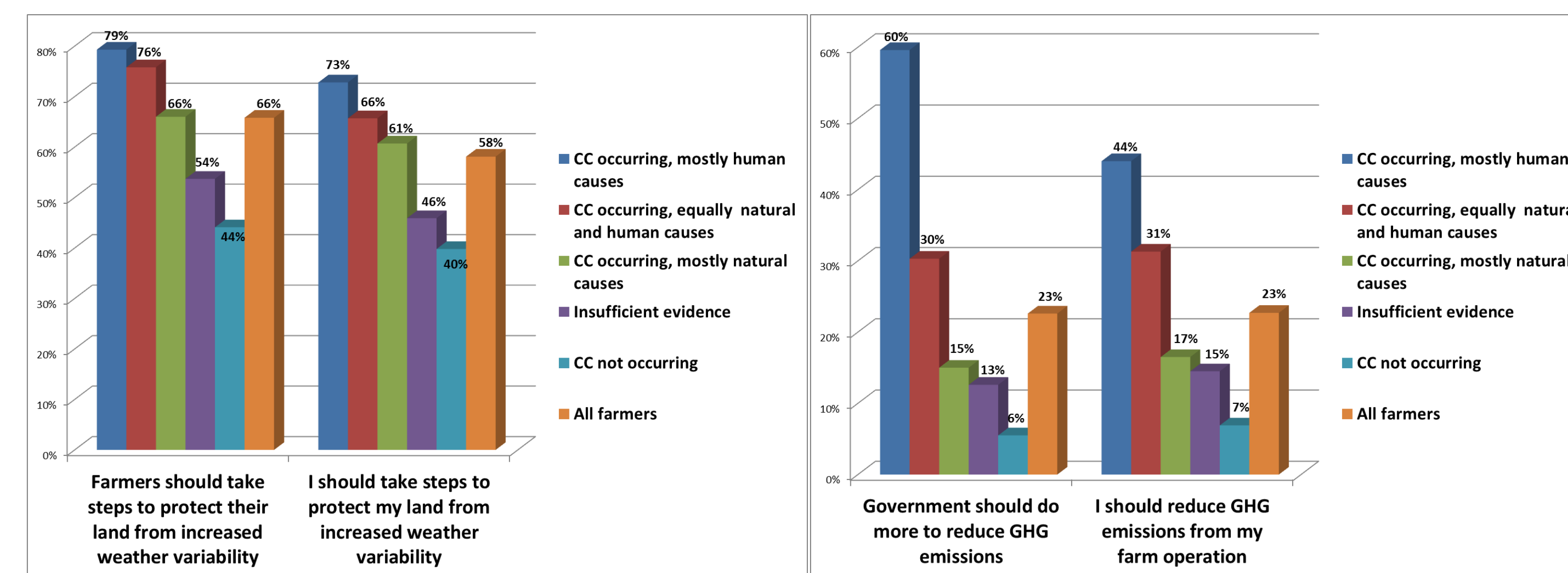


Figure 6. Percent agree or strongly agree, steps to protect land

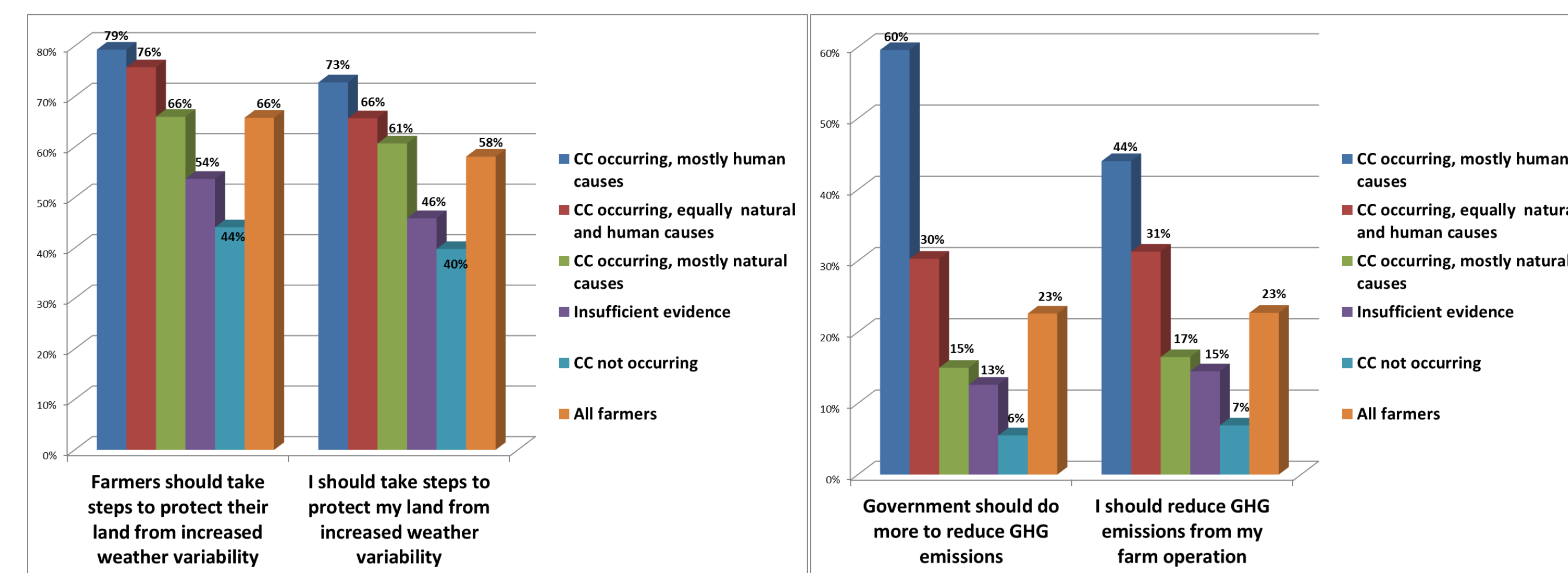


Figure 7. Percent agree or strongly agree, GHG reduction

Preliminary Survey Results

Previous research with Iowa farmers found strong relationships between beliefs about climate change, perceived risks, and support for adaptation and mitigation (Arbuckle et al. under review). Initial analyses of the CSCAP survey data comparing risk perceptions and support for adaptation and mitigation by climate change beliefs identified similar patterns.

Beliefs (Fig. 2)

- Two-thirds believe climate change is occurring
- 8% attribute it primarily to human activity
- 33% believe it is due to human and natural causes equally
- 25% believe that it is due mostly to natural variation
- 31% believe that evidence is insufficient to determine with certainty whether climate change is occurring
- 4% do not believe that climate change is happening

Perceived risks (Figs. 3-5)

Concerns about predicted impacts of climate change on agriculture, including increases in drought, heat, excess water, and pest and disease, vary with beliefs about climate change. Farmers who attribute climate change to human activity reported significantly higher levels of concern than those who believe it is due to natural causes, are uncertain about the existence of climate change, or do not believe it is happening.

Support for adaptation and mitigation (Figs. 6 & 7)

Farmers who believe that climate change is occurring and due at least in part to human activity report significantly higher levels of support for taking additional steps to protect land from increases in weather variability. Likewise, they are much more likely to support government and individual action to reduce GHG emissions.

REFERENCES

- Arbuckle, J. G., Wright Morton, L. and J. Hobbs. "Trust, Beliefs, and Perceived Risk as Determinants of Farmer Support for Adaptive and Mitigative Responses to Climate Change." Under review for *Rural Sociology*.
- Beddington, J., M. Asaduzzaman, M. Clark, A. Fernández, M. Guillou, M. Jahn, L. Erda, T. Mamo, N. Van Bo, C. A. Nobre, R. Scholes, R. Sharma, and J. Wakhungu. 2012. *Achieving Food Security in the Face of Climate Change: Final report from the Commission on Sustainable Agriculture and Climate Change*. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).
- Howden, S. M., J. F. Soussana, F. N. Tubiello, N. Chhetri, M. Dunlop, and H. Meinke. 2007. "Adapting Agriculture to Climate Change." *Proceedings of the National Academy of Sciences* 104(50):19691-6.
- IPCC. 2007. "Climate Change 2007: Synthesis Report, Summary for Policymakers." In *Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by R. K. Pachauri and A. Reisinger. Geneva: Intergovernmental Panel on Climate Change.
- Maibach, E., C. Roser-Renouf, and A. Leiserowitz. 2009. "Global Warming's Six Americas 2009: An Audience Segmentation Analysis." New Haven, CT: Yale Project on Climate Change Communication.
- McCarl, B.A. 2010. "Analysis of climate change implications for agriculture and forestry: an interdisciplinary effort." *Climatic Change* 100:119-124.
- Nigg, J. M., and D. Mileti. 2002. "Natural Hazards and Disasters." Pp. 272-294 in *Handbook of Environmental Sociology*, edited by R. E. Dunlap and W. Michelson. Westport, CT: Greenwood Press.
- Weber, E. U. and P. C. Stern. 2011. "Public Understanding of Climate Change in the United States." *American Psychologist* 66:315-28.

¹ Department of Sociology

² Department of Natural Resource Ecology and Management