

# NC STATE ECONOMIST

COLLEGE OF AGRICULTURE & LIFE SCIENCES

---

## Farmer Perceptions and Beliefs about Climate Change: A North Carolina Perspective

*Roderick M. Rejesus, Associate Professor and Extension Specialist*

Climate change is a contentious issue. Strong feelings exist on all sides regarding whether climate change is occurring and, if so, what public policies should be enacted to address the problem. Given the potentially important impact of climate change on all segments of society, there have been various studies that documented the general perceptions of Americans regarding climate change. For example, Leiserowitz (2006) conducted a national, representative survey of the U.S. public and found that Americans perceive climate change risk as moderate in magnitude. That study also found that Americans support a variety of policies to mitigate climate change, but oppose several carbon tax proposals.

Aside from research examining the general public's perceptions about climate change, it is important to specifically examine agricultural producers' perceptions about climate change as the agricultural sector often plays a pivotal role in policies that aim to mitigate the effects of this phenomenon. Given the clout agricultural producers have in Congress, the perceptions of this small but influential group may have a significant effect on the policy debate and on laws that are eventually enacted. Only one study by Weber (1997) has aimed to identify and understand the perceptions of U.S. agricultural producers regarding climate change. Weber surveyed 48 farmers in east-

central Illinois and found that a majority of these farmers (53%) did not expect any significant change in climate over the next twenty to thirty years. Additionally, she found that 49% of the surveyed farmers do not believe in the existence of global warming.

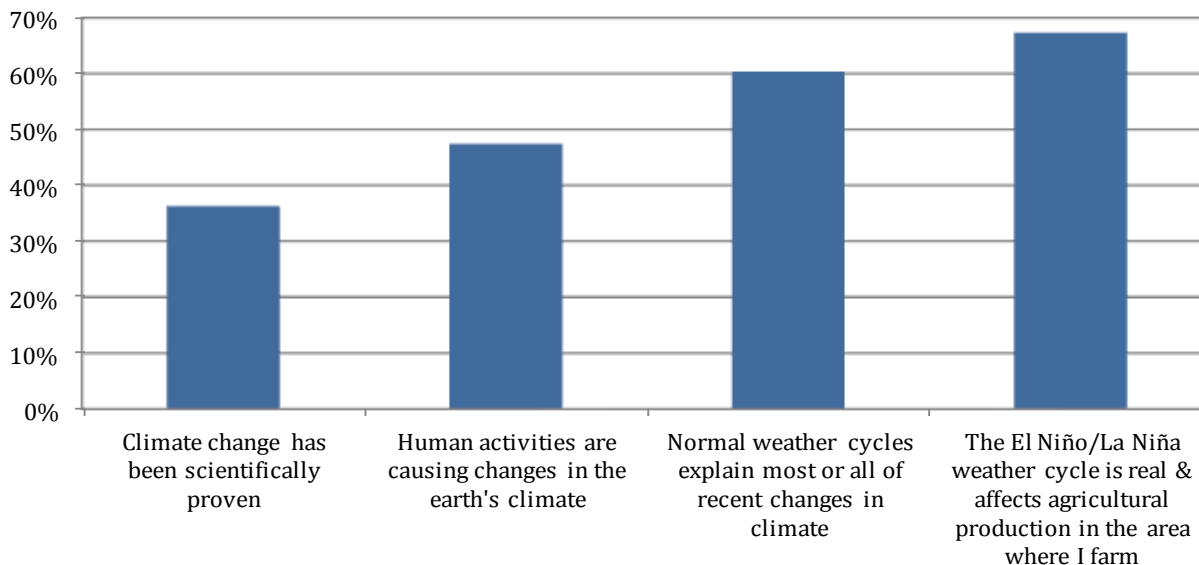
This issue of the NC State Economist discusses the findings from a more recent study that examined North Carolina crop producers' perceptions of climate change and their beliefs about the effects of climate change on row crop agriculture.

### Do North Carolina Farmers Believe in Climate Change?

Data from a 2009 mail survey administered to 315 farmers growing corn, cotton, grain sorghum, soybeans, rice, or wheat in North Carolina was used to examine farmer perceptions about the existence of climate change. The survey was conducted by the U.S. Department of Agriculture's National Agricultural Statistics Service (NASS), using its extensive database and sampling procedures.

With regards to the specific questions about their perceptions about climate change, farmers were first asked to indicate whether they agree or disagree with the following statements: (a) "I believe climate change has been scientifically proven," (b) "I believe human activities are causing changes in the Earth's climate," (c) "I believe normal

**Figure 1. Proportion of Surveyed Farmers Agreeing or Strongly Agreeing to the Different Statements on Climate Change**



weather cycles explain most or all recent changes in climate,” and (d) “The El Niño/La Niña cycle of weather patterns is real and affects agricultural production in the area where I farm.” Farmer responses were recorded using a Likert scale where possible responses were strongly disagree, disagree, no opinion, agree, and strongly agree.

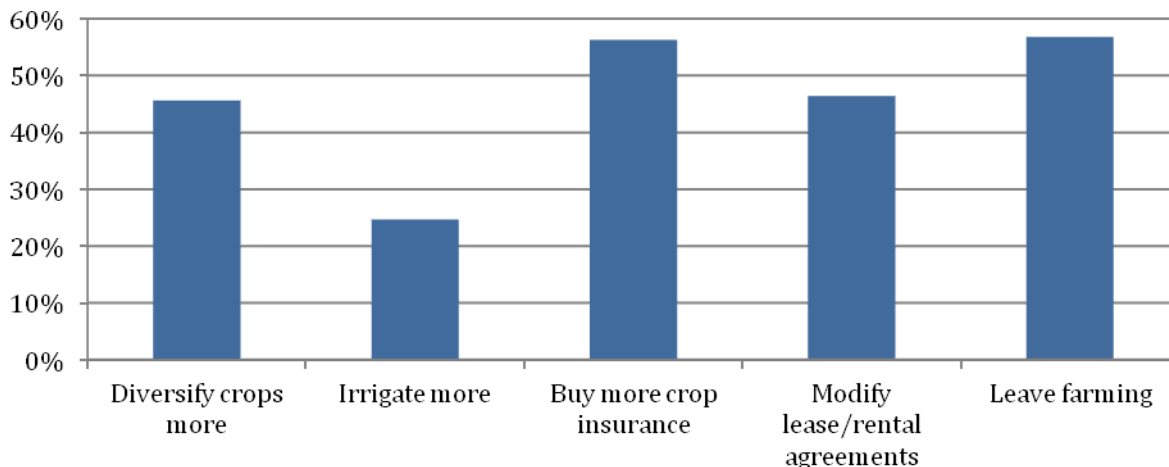
Responses from farmers in North Carolina suggest that only 36.3% agree or strongly agree with the statement that climate change has been scientifically proven (Figure 1). Among farmers that are 51 years or older, 42% agree or strongly agree with the statement that climate change has been scientifically proven. In contrast, only 24% of farmers younger than 51 years agree or strongly agree with the statement. These results suggest that North Carolina producers are generally skeptical about whether or not there is scientific validity to the existence of climate change, with older

producers being more accepting of the existence of climate change. However, when asked whether human activities cause recent changes in climate, about half of the North Carolina producers surveyed (47.4%) indicate that they agreed or strongly agreed with this statement.

When North Carolina producers were asked their degree of agreement to the following statement: “I believe normal weather cycles explain most or all recent changes in climate,” 60.4% agree or strongly agree with the statement (Figure 1). Similarly, 67.3% agree or strongly agree with the related statement that El Niño/La Niña cycles exist and affect agricultural production where they farm.

Based on the responses above, it appears that farmers in North Carolina are more willing to admit that normal weather cycles (like El Niño/La Niña) exists and that these weather cycles, as well as human activities, explain or

**Figure 2. North Carolina Farmers' Beliefs about the Likely Response to More Extreme Weather due to Climate Change**



contribute to climate change. However, farmers in North Carolina are more skeptical about the existence of climate change and they are less willing to definitively say that there is scientific evidence to show that climate change exists.

**North Carolina Producers' Beliefs on the Effects of Climate Change on Yields**

Sampled producers were also asked about how they thought climate change would affect the mean and variability of their yields for their primary crop over the next 25 years. Responses regarding average yields were recorded in a five-category scale as follows: average yields will decrease by more than 10%, average yields will decrease between 5% and 10%, average yields will not increase or decrease by more than 5%, average yields will increase between 5% and 10%, and average yields will increase by more than 10%. An identical response format was used for the question on variability of yields.

Only 18.3% of the surveyed North Carolina producers believe that climate change will decrease average yields by 5% or more over the next 25 years. In addition, only 11.6% of the producers surveyed in North Carolina believe that climate change will increase yield variability

by more than 5% over the next 25 years. When we specifically examine only those producers that agreed or strongly agreed with the statement that climate change has been scientifically proven, we find that only 28% of these producers believe that climate change will decrease average yields by 5% or more over the next 25 years. Only 13% of producers who likely believe in the existence of climate change indicate that climate change will increase yield variability by more than 5% in the future. These results indicate that North Carolina farmers have little belief that climate change will have adverse effects on average crop yields and yield variability, even those who generally acknowledged the presence of climate change.

**Beliefs about the Likely Producer Response to Climate Change**

Producers in North Carolina were also asked about their perceptions on how farmers might respond to extreme changes in weather (i.e. more frequent droughts, floods, frosts, etc.) due to climate change. Using a five-category Likert scale (1= extremely unlikely response to 5 = very likely response), producers indicated how likely the following actions would be in response to more extreme weather events: diversify

crops more, irrigate more, buy more crop insurance, modify lease/rental arrangements, and leave farming.

Figure 2 reveals the surveyed farmers' opinions about likely responses actions to extreme weather events due to climate change. The two actions that North Carolina farmers believe as the likely (or very likely) response to more extreme weather events due to climate change are exiting farming (57%) and buying more crop insurance coverage (56%). Further crop diversification (46%) and modifications of lease/rental agreements (46%) are the next two actions that the surveyed producers think will be the likely response to more extreme weather. In contrast, only about 25% of the surveyed North Carolina producers think that more irrigation is the likely response to more extreme weather caused by climate change.

### Discussion

The survey results reveal that crop producers from North Carolina are generally climate change skeptics, which has obvious implications for a number of current federal policies and for future policy initiatives designed to mitigate or adapt to climate change. One implication is that climate change legislation will likely be a tough sell to these groups and to farm-state politicians who pay significant attention to the general sentiments of the majority of their farmer constituents. The survey responses suggest that not only is there relatively little acceptance of the existence of climate change in North Carolina, but also little belief that climate change will have negative effects on crop yields. These results can be interpreted as suggesting that crop producers will support policies to mitigate climate change only when compensated. However, our results also suggest that older producers (> 51 years old) tend to agree with the statement that climate change has been scientifically proven, while younger producers do not. This result implies that extension programs that emphasize

climate change adaptation strategies may be better-suited for older producers and extension efforts that aim to impart knowledge about the science behind climate change may fit younger farmers.

A clear area for further study is what information, or education programs would modify producer perceptions (especially for younger farmers) to be more consistent with current scientific findings (see Weber 1997, 2006). This is particularly intriguing considering the survey results that crop producers tend to be willing to accept the existence of recurring El Niño events while simultaneously rejecting the existence of climate change. Crop producers are likely to be reasonably well informed on both topics from similar sources. It is possible that El Niño events have been personally experienced (and, thus adequately perceived) by farmers, which leads to their strong belief about the existence of this phenomenon. In contrast, climate change is a gradual process with effects that are obscured by random weather events and cyclical climate patterns, so that farmers are more skeptical about whether they are observing its effects (Weber 1997).

Since farmers do not easily perceive the consequences of climate change, previous research has suggested the need to provide scientific and statistically based information about climate change from multiple sources in order to influence perceptions about climate change risks (Weber 1997). In particular, Weber (2010) suggests that "we should find ways to evoke stronger affective reactions towards the risk of climate change in citizens, managers, or public officials, by making the expected climate effects more vivid or concrete." Current and past research supports the need for more information and outreach efforts. However, the future challenge is how to effectively deliver unbiased information on climate change specifically to agricultural producers in North Carolina — and across the United States.

---

## References

Coble, K., R.M. Rejesus, P. Mitchell, and T. Knight. 2011. "U.S. Agricultural Producer Perceptions of Climate Change." Unpublished manuscript, Mississippi State University, Starkville, MS.

Leiserowitz, A. 2006. "Climate Change Risk Perception and Policy Preferences: The Role of Affect, Imagery, and Values." *Climatic Change* 77(1):45-72.

Weber, E.U. 1997. "Perception and Expectation of Climate Change: Precondition for Economic and Technological Adaptation," in M.H. Bazerman, D.M.

Messick, A.E. Tenbrunsel, and K.A. Wade-Benzoni (eds.), *Environment, Ethics, and Behavior: The Psychology of Environmental Valuation and Degradation*, ed.. San Francisco, CA: New Lexington Press, pp. 314-341.

Weber, E.U. 2006. Experience-based and description-based perceptions of long-term risk: why global warming does not scare us (yet). *Climatic Change* 77(1): 103-120.

Weber, E.U. 2010. "What shapes perceptions of climate change?" *WIREs Climate Change* 1: 332-342.