

# Farmers warned to get ready as climate change threatens crops

September 7 2009, By Jay Price

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Even if global temperatures rise slowly, climate change could slash the yields of some of the world's most important crops almost in half, according to a new study co-authored by an N.C. State University scientist.

The study, recently published online in Proceedings of the National Academy of Sciences, looked at three frequently used scenarios for global warming. It found the average U.S. yields for corn, soybeans and cotton could plummet 30 percent to 46 percent by the end of the century under the slowest warming scenario, and 63 percent to 82 percent under the quickest.

"There are some caveats, but this is a real cause for concern," said Michael Roberts, an assistant professor of agricultural and resource economics at NCSU.

Roberts collaborated with Wolfram Schlenker of Columbia University on the study. They used massive amounts of data on [crop yields](#) and weather from 1950 to 2005 to look at yields from nearly every U.S. county. They focused on swings in temperature on individual days.

Many earlier studies examined temperature changes averaged over longer periods, such as a month or a growing season, Roberts said. That can mask the effects of extreme temperatures on crops.

"While crop yields depend on a variety of factors, [extreme heat](#) is the

best predictor of yields," Roberts said. "There hasn't been much research on what happens to crop yields over certain temperature thresholds, but this study shows that temperature extremes are not good."

Scientists are starting to look more closely at temperature spikes and dips because they can have outsized impact, said David Walter Wolfe, a Cornell University expert on the effects of climate change on crops who was not involved in the study.

A simple example, Wolfe said, is freezing. A study using the average of lows for several days might not even show below-freezing temperatures, and yet farmers may have suffered a catastrophe. At the other end of the temperature scale, one day of mid-90s temperatures can kill all the flowers on a crop of pepper plants.

There are a number of factors besides temperature that will affect crop yields, Roberts said. The growing atmospheric concentration of carbon dioxide, needed for photosynthesis, could offset some of the losses, he said. Also, major agricultural companies are working on new plant varieties that would be able to handle climate changes.

Predicting the effects of climate change is complicated. Carbon dioxide can spur weed growth, for example, and warmer winters allow some kinds of pests to move into new areas and help existing pests survive better. Also, [climate change](#) is shifting precipitation patterns and in some places, Wolfe said, creating the sorts of extremes in rainfall that Roberts and Schlenker studied in temperature.

Wolfe said the effects shown in their study would inevitably be blunted if farmers shift to other crop varieties, change their planting times or change their crops altogether. Still, the study is one more tool to use in persuading farmers to prepare for change, he said.

Wolfe frequently speaks to farmers and said his message is always the same: They are the first generation of growers who can't count on historical climate information to help them plan things such as when to plant and what varieties to choose.

"They're no longer farming in a static environment," he said. "They can't rely on the calendar to tell them when to plant, they can't rely on the variety of seeds they have always used, and they can't rely on dealing with the same insect pests, because it's all a moving target now."

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