

No-till could help maintain crop yields despite climate change

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Reducing tillage for some Central Great Plains crops could help conserve water and reduce losses caused by climate change, according to studies at the U.S. Department of Agriculture (USDA).

Research leader Laj Ahuja and others at the Agricultural Research Service (ARS) [Agricultural Systems](#) Research Unit at Fort Collins, Colo., superimposed climate projections onto 15 to 17 years of field data to see how future [crop yields](#) might be affected. ARS is USDA's chief intramural scientific research agency, and this work supports the USDA priority of responding to climate change.

The field data was collected at the ARS Central Great Plains Research Station in Akron, Colo. The projections included an increase in equivalent [atmospheric carbon dioxide](#) (CO₂) levels from 380 parts per million by volume (ppmv) in 2005 to 550 ppmv in 2050. The projections also included a 5-degree Fahrenheit increase in [summer temperatures](#) in Colorado from 2005 to 2050. The ARS scientists used these projections to calculate a linear increase of CO₂ and temperature from 2050 to 2100.

Ahuja's team used the [Root Zone](#) Water Quality Model (version 2) for [crop rotations](#) of wheat-fallow, wheat-corn-fallow, and wheat-corn-millet to see how yields might be affected in the future. They simulated different combinations of three climate change projections: rising CO₂ levels, rising temperatures, and a shift in precipitation from late spring and summer to fall and winter. They ran the model with the projected climate for each of the 15 to 17 years of field crop data for each

cropping system.

When the researchers used all three climate factors to generate yield projections from 2005 to 2100, the yield estimates for the three cropping systems dropped over time. Declines in corn and millet yields were more significant than declines in wheat yields.

Ahuja also simulated earlier planting dates and no-till management to see if either change reduced yield losses, but only the no-till option helped. In the wheat-fallow rotation with no tillage, wheat yields were higher than with conventional tillage through 2075. But by 2100, when summer temperatures had increased by 8 degrees F, even the no-till yield advantage was lost.

The results from this work were published in *Climatic Change* in 2012.

Provided by United States Department of Agriculture

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