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## Heatwave's warning for future of farming

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Europe may be breathing a sigh of relief as its record-breaking heatwave eases, but there is still plenty to worry about. Temperature changes caused by global warming are likely to transform agriculture on both sides of the Atlantic.

While the heatwave claimed thousands of lives in France, started bush fires in Portugal and toppled temperature records from London to Baghdad, the European Commission (EC) issued a little-noticed bulletin.

It showed a prolonged drought was causing drastic changes in agricultural output, especially in southern Europe. And the changes almost perfectly match predictions of the effects of global warming over the next century.

Meanwhile in the US, the latest forecasts are confirming that, whatever the prevarications of the Bush administration, climate change will have a very real impact on the country.

The eastern and western seaboard of the US will become much wetter over the next century, while some central states will become so starved of water that they will be unable to support agriculture at all.

## North up, south down

The European report by the EC's Joint Research Centre in Brussels reveals that the prolonged heatwave has caused crop yields to drop across southern Europe. For example, high temperatures and water shortages have cut maize and sugar beet yields in Italy by a quarter, and wheat yields have fallen by a third in Portugal.

However, yields have risen in northern Europe, which has not been affected by drought. For example, the warm weather has helped increase sugar beet yields by a quarter in Ireland and by up to 5 per cent in Denmark and Sweden. Yields of oilseed rape, or canola, rose by 12 per cent in Finland.

This shift in productivity is almost exactly what was forecast in 2002 by Jørgen Olesen of the Danish Institute of Agricultural Sciences in Tjele and Marco Bindi of the University of Florence in Italy. Their analysis predicts that agricultural productivity will soar in northern Europe as the region becomes wetter. Higher temperatures and increased carbon dioxide levels will further boost yields in the region (*European Journal of Agronomy*, vol 16, p 239).

But in southern Europe, temperature changes will lead to water shortages and lower crop yields, and agriculture could cease altogether in the most parched regions.

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"With drier conditions in the south, it will be difficult to maintain dairy production, for example, and there will be parts of southern Europe where agricultural production is no longer viable," says Olesen. "If there's competition for [water], urban areas will probably win over agriculture."

**Wet, wet, wet**

In the US, analysis by a team at the Joint Global Change Research Institute - a collaboration between the Pacific Northwest National Laboratory and the University of Maryland in College Park - predicts that rainfall will increase across much of the country, especially towards the end of this century.

"The eastern part is likely to be the wettest," says lead researcher César Izaurralde. Overall, the team expects global warming to deliver better yields to US farmers.

But Kansas, Colorado and Nebraska are just some of the central states that could suffer drought, the researchers say in two papers published in June this year (*Agricultural and Forest Meteorology*, vol 117, p 73 and p 97).

Both groups of researchers warn that the recent heatwave is a salutary warning of the changes to come. "It's dangerous to push these things under the carpet because we need to start planning now for the impacts of climate change," says Olesen. Izaurralde agrees. "It's not too soon to begin building a more resilient agricultural system."

[Andy Coghlan](#)

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