

Soil quality key to increasing crop production and resilience to climate change

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New research has found that high-quality cropland soils limit losses in response to warmer climates and support higher yields.

The international team of experts, including Professor Pete Smith from the University of Aberdeen, found that improving [soil quality](#) could reduce the climate change-induced decline in crop production in China by as much as 20%.

In the study, published in *Nature Climate Change*, the authors from China, the U.K. and Germany addressed how the interactions between soil quality and climate change influence food output productivity from croplands.

Lead author, Professor Mingsheng Fan of China Agriculture University explains: "It is estimated that global food production may have to increase by as much as 60 to 100 percent by 2050 to meet projected demands.

"However, agriculture is facing greater challenges than ever with climate change and [soil degradation](#) being among the biggest stressors, not only constraining [crop production](#) capacity but also causing great volatility."

The team suggest that soil quality, defined as the capacity of the soil to provide nutrients and water, holds the solution to both resilience to climate change and future food security. In the paper, they warn that inadequate consideration of soil quality and interactions with climate change will impede general understanding of the food security challenge in the face of rapidly changing [environmental conditions](#).

Professor Mingsheng Fan continues: "We found that across crops and environmental conditions, high-quality soils reduced the sensitivity of crop yield to climate variability, leading to higher and more stable crop yields, and improving also the outcome for yields under climate change, compared to low-quality soils."

Professor Tim Benton of the Royal Institute of International Affairs who

also contributed to the study added: "Soil quality has recently received a lot of attention with a growth of interest in regenerative agriculture to restore and enhance soil quality. However, there is a dearth of good quality information about its real potential.

"This study goes some way towards showing that better management of soils will enhance yields as well as, potentially, improving [carbon sequestration](#), water holding potential and soil biodiversity."

Dr. Christoph Müller of the Potsdam Institute for Climate Impact Research and co-author of the paper, adds: "In climate change research, soils are often regarded as carbon pools that respond to climate change and management. However, the importance of soil quality for land productivity and thus the potential to sequester carbon in ecosystems has not been sufficiently considered so far."

Professor Pete Smith, chair in plant and [soil science](#) from University of Aberdeen explained: "This study shows that improving soil quality will be a critical strategy for adapting to [climate change](#) and avoiding some of the inevitable negative effects of increased temperatures that will occur even if the Paris climate goals can be achieved."

More information: Lei Qiao et al, Soil quality both increases crop production and improves resilience to climate change, *Nature Climate Change* (2022). [DOI: 10.1038/s41558-022-01376-8](https://doi.org/10.1038/s41558-022-01376-8)

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