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Leibniz Centre for Agricultural Landscape Research (ZALF)

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New study published:

## Climate change threatens cereal crop yields

The effects of climate change pose a major challenge for cereal production in many regions. In a recently published study in "Nature Reviews Earth & Environment", ZALF scientists have investigated how warmer temperatures, increased carbon dioxide levels and changes in water availability affect globally important cereals such as wheat, maize, millet, sorghum and rice.

In the case of a climate change scenario without adaptation measures, the simulated global crop yield losses for cereals are between seven and 23 percent. The negative effects of climate change on cereal yields in higher latitudes could potentially be offset or even reversed through carbon dioxide fertilization and adaptation options. However, this would require significant investment and resources, for example in irrigation infrastructure and water availability. These adaptations could increase wheat yields in higher latitudes by up to 40 percent compared to the baseline, according to the authors of the study. In lower latitudes, carbon dioxide fertilization is less beneficial. Irrigation and nutrient management are probably the most effective adaptation options.

Millet and sorghum crops are often neglected in other studies in favor of wheat, maize and rice, but are important for food security in parts of Africa. Therefore, more targeted experimental and modelling studies are necessary to gain a clearer understanding of their response to climate change. The study underlines the need for further research to better understand the links between climate change and crop yields. Furthermore, the authors identified the development of new crop varieties as one of the key steps to mitigate the adverse effects of climate change on crop yields.

### Funding:

The study was funded by the German Research Foundation (DFG, project no. 520102751 and as part of the Excellence Strategy - EXC 2070-390732324).

### Further information:

Paper: Rezaei, E.E., Webber, H., Asseng, S. et al. Climate change impacts on crop yields. Nat Rev Earth Environ (2023). <https://doi.org/10.1038/s43017-023-00491-0>

News article about the importance of regionally adapted cultivars and global wheat production:

<https://www.zalf.de/en/aktuelles/Pages/DIR/Globale-Weizenproduktion-verdoppeln.aspx>



In a new study, ZALF scientists have investigated the effects of climate change on major cereal crops such as wheat, maize, millet (pictured here), sorghum and rice. | The picture can be used for editorial purposes by stating the source: © Bishnu Sarangi / Pixabay | Picture in color and print quality:

<http://www.zalf.de/de/aktuelles>

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**About the Leibniz Centre for Agricultural Landscape Research (ZALF) in  
Muencheberg, member of the Leibniz Association:**

Mission of ZALF is to deliver solutions for an economically, environmentally and socially sustainable agriculture –together with society.

As a contribution to overcoming global challenges such as climate change, food security, biodiversity conservation and resource scarcity, we develop and design crop systems, integrated in their landscape contexts that combine food security with sustainability. Therefore we process complex landscape data with a unique set of experimental methods, new technologies and models as well as socio-economic approaches.

ZALF research is integrated systems research: starting from processes in soils and plants to causal relationships on the field and landscape level up to global impacts and complex interactions between landscapes, society and economy. [www.zalf.de](http://www.zalf.de)