

February 13th, 2020

Leibniz Centre for Agricultural Landscape Research (ZALF)

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Silica increases water availability for plants: Bayreuth researchers discover a way to enhance food security

As a result of climate change, more frequent and longer drought periods are predicted in the future. Drought risks are suggested to decrease agricultural yield. Researchers at the University of Bayreuth and the Leibniz Centre for Agricultural Landscape Research (ZALF) have now discovered a way to mitigate this problem: Amorphous silica is able to significantly increase the amount of available water for plants. This offers an opportunity to enhance global food security despite climate change. The researchers presented their findings in the journal *Scientific Reports*. They suggest a soil management that ensures a higher amorphous silica content.

The new research results are the product of close collaboration between environmental geochemists and soil physicists. The scientists have systematically investigated how amorphous silica affects the ability of soils to absorb and store water, for the first time. The results are impressive: Even if the proportion of amorphous silica in soils increases by just one percent by weight, the amount of plant available water in soils increases by up to 40 percent – or even more", reports Dr. Jörg Schaller from the Department of Environmental Geochemistry at the University of Bayreuth and ZALF. This is because gels, which contain enormous amounts of water, form in the soil out of amorphous silica molecules. These water supplies are easily accessible to the roots of plants.

However, it has been known for some time that conventional methods of agriculture lead to a steady decline of the content of amorphous silica in the soil. In combination with the expected consequences of climate change, this may lead to serve drought problems in e.g. agricultural systems in future, decreasing yield even more. This increases the risks to global food security. "Our new study shows a way to mitigate this risk. For this, soil management should be modified to increase the amorphous silica stocks in soils. Moreover, artificial produce amorphous silica –

which has the same chemical properties as the biogenic silica – should be used as soil amendments. Such soil silica amendments may play an important role in global food security in the future," Schaller said. Mehr Informationen:

Read the scientific paper in issue 10 of Scientific Reports:

<https://www.nature.com/articles/s41598-020-59437-x>

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SCIENTIFIC REPORTS

natureresearch

Scientific Reports is an online open access scientific mega journal published by Nature Publishing Group. |
Quelle: © Nature Publishing Group

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About the Leibniz Centre for Agricultural Landscape Research (ZALF) in Muencheberg, one of the institutes 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