

Arable cropping system adapted to climate change

Innovative cultivation systems to promote yield stability and humus formation

Agriculture has the potential to reduce greenhouse gas emissions and fix carbon through innovative farming systems and humus building. German Operational Group HUMUVATION is testing a combination of cultivation systems and adapting them to climatic conditions in order to ensure humus formation and yield stability. These should lead to positive effects on the environment, climate and food production.



Climate change affects crop yields, causing them to fluctuate significantly. As well as being impacted by climate change, agriculture itself also contributes to it through the release of greenhouse gases. This Operational Group decided to tackle these two challenges by focusing on agriculture's potential to fix carbon. It will combine existing cultivation systems and adapt them to the climatic conditions in Hessen, Germany in order to guarantee humus build-up and yield stability.



The project began in 2019 and the partners (farmers, scientists and advisers) are carrying out practical tests on 5 farms, a total of 36 test plots over 3 years. In parallel, another test will be carried out under controlled conditions (on-station research). Using a crop rotation with wheat, maize and broad beans, the partners will analyse the effect of different catch crop mixtures, biochar amendments and cultivation methods with regard to humus build-up, CO₂ sequestration and yield quantity and quality. Lucas Kohl from the project lead partner VÖL explains "The project is completely designed for use in practice, which is why the methods are examined both in practical test organic farms in addition to the on-station test".

The main element of the new cultivation system is to grow deep-rooted catch crops, which are cultivated after the harvest of the main crops (wheat, broad beans, maize). Tillage is avoided. These catch crops root through the soil, even through deep layers, and help protect nutrients in the soil from being washed away. They also enable increased CO₂

sequestration which contributes to humus build-up in the soil. These catch crops also provide a colorful flowering mixture for insects. The catch crop remains on the soil surface to protect it from losing moisture, high temperatures and weeds and to provide food for insects and other life in the soil. The new main crop is sown directly into the catch crop that has been shallow cultivated (about 3 cm). Biochar is also added to subsoil to enhance root growth and to reduce soil compaction. Lucas continues "The particular strength of this cultivation system is the systems approach, which results from the interaction of the mechanical and biological processes which only fully work when combined."

The project will compare the innovative cultivation system with conventional cultivation systems (no catch crop mixtures, intensive tillage) on the different test farms. "We will specifically look at the influence of the different measures implemented on the environment by determining different carbon fractions in soil and GHG emissions as well as the influence on the yield stability of agricultural products - wheat, broad beans, maize." says Tim Treis, also from VÖL.

The project will establish a practical research network of farmers, consultants and scientists in order to ensure that the results are of practical relevance. They will also evaluate the economic viability of the cultivation system. The aim is to be able to provide farmers in Hessen with a practical guide to apply the methods developed which can be disseminated further.

Sources:

- <https://ec.europa.eu/eip/agriculture/en/find-connect/projects/humuvation-innovative-anbausysteme-zur-f%C3%B6rderung>
- <https://www.humuvation.de/>

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