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Mercator Research Program | Call 6

Resilience of organic and conventional production systems to drought

Background

With global climate change, severe weather events, including drought, will become more frequent. Since drought is the most significant environmental stress in agriculture worldwide due to its adverse impact on agricultural productivity, resilient farming practices need to be developed to ensure food security. However, farming systems in Switzerland that are most resilient to drought are yet to be determined.

Objective

The main objective of this project is to compare the responses of the main Swiss arable farming systems to simulated summer drought. The systems evaluated will be organic and conventional arable farming, with and without/less tillage. The project aims to determine the reasons why certain systems perform better or worse under ambient and stress conditions.

Research Approach

The Farming Systems and Tillage Experiment (FAST) will be used and summer drought will be simulated using portable roofs. The effects of decreased precipitation on plant yield, nutrient uptake, and grain or fodder quality in the four Swiss farming systems will be identified, along with plant water uptake, plant water use, changes in soil structure, and responses of soil microbes. By combining all these measurements, the project strives to identify potential mechanisms responsible for enhanced resilience of these farming systems to summer drought. State-of-the-art technologies including stable isotope analysis, high

throughput molecular sequencing tools, and structural equation modeling will be utilized.

Relevance and Expected Outcomes

By tracking multiple variables such as plant yield, water sources, and soil biota communities, this project will provide insight needed not only to compare the farming systems, but also to test which factors can best explain drought resistance. The results can then be applied to help further develop organic and conventional production systems alike.

Food System Challenges Addressed

Enhancing ecosystem resilience, sustainable farming practices, mitigating effects of climate change.

www.worldfoodsystem.ethz.ch/research/research-programs/MRP

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