



Mercator Research Program | Call 5

Global Organic Agriculture: Challenges and Opportunities

Background

Global agriculture is causing large environmental impacts, and increasing population and affluence add pressure on the natural resources and increase food security risks. One option to deal with these challenges is intensification of food production. An alternative approach is organic agriculture, which generally involves yield reductions.

Objective

The project aims to analyze the current environmental performance of global organic agriculture on a high spatial resolution and to identify improvement potentials and trade-offs of transforming conventional production to organic agriculture with respect to food supply and environmental impacts.

Research Approach

- Develop an improved crop water consumption model with a focus on legumes in crop rotations and winter cover crops.
- Introduce a nutrient balance model including livestock and legume interactions into the global agricultural model to derive yield impacts of changes in fertilization levels.
- Improved consideration of key characteristics of organic production systems on land and pesticide use in the global model.
- Assessment of organic and conventional production systems with respect to water and land use impacts, eutrophication, climate change and ecotoxicity.
- Overall environmental and productivity assessment of global organic and conventional agriculture.

Relevance and Expected Outcomes

The study will advance global modeling of agricultural production by creating a model with high spatial resolution that includes specific aspects relevant for organic production. Findings from this project will allow i) identifying regions and systems that are most favorable for a shift from conventional to organic production, and ii) addressing differences in environmental impacts between various production systems as well as trade-offs and synergies between different environmental impacts, such as water scarcity and global warming.

Food System Challenges Addressed

Food security, global warming, land use impacts, nutrient cycles, pesticide use, water eutrophication, water scarcity.

www.worldfoodsystem.ethz.ch/research/MRP →

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