Project ARTEMIS

Agro-ecological strategies for promoting climate change mitigation and adaptation by enhancing soil ecosystem services and sustainable crop production

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About ARTEMIS

- Duration: 24 months
- Start: November 2022
- Coordination: Agroscope (lead) and CREA (deputy)
- Consortium: 12 Partners from 7 European countries
- Geographical coverage: 9 different agro-environmental (AE) zones

Aim: to determine how specific **agro-ecological (AE)** land management practices affect soil ecosystem services

Figure 1. Participating countries and consortium members.

WP2 - Identification of AE systems and soil properties that support yield stability using long-term experiments (LTEs)

LTEs on different agro-ecological practices throughout participating countries were selected. Yield stability was chosen as an indicator to test performance of these practices. Based on these LTEs, a **harmonized dataset** was created, which was used for the modelling approach of WP3.

WP4 - Meta-analysis on soil ecosystem services in different AE systems

Conducting **2 meta-analysis** on the effects of **organic vs conventional farming** on:

1. **SOC**
   - 49 studies from 36 articles
   - Meta-analysis to be conducted
2. **Yield**
   - 50 studies from 43 articles
   - Yield in organic 30% lower than in conventional farming
   - Yield variation in organic 48% larger than in conventional farming

Further, a **narrative review** of organic farming and conservation agriculture effects on nitrous oxide is produced.

WP3 - Identification of best AE practices fostering soil health in a changing climate

ARMOSA process-based numerical model was applied to assess the impacts of conventional and organic farming on…

- crop yield
- SOC dynamics
- NO_3 leaching
- N_2O emissions

… in crop and livestock systems under climate conditions for Finland.

A **fuzzy logic-based trade-off analysis** was applied to assess yield stability and environmental impacts of crop rotations typical for Finland across different future climatic scenarios.

WP5 - Framework for AE lighthouse farm network on soil quality and ecosystem services

A framework of **indicators** capable of assessing relevant soil-related ecosystem services and soil properties at a farm level was created. Alongside, a **European lighthouse farm network** of agro-ecological farms was formed (located in Belgium, Italy, Spain and Switzerland).

The framework was tested on the farms in the network and monitoring of indicators is conducted.

Benefit for Austria: Up to date synthesis data on effect of organic arable farming on yield, yield variability and SOC, relevant to environmental zones present in Austria. This information can be used for modelling efforts but also to inform farmers on how to improve yield, yield variability and SOC in organic farming systems.

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