



CORE Organic II



Reduced tillage and green manures

– Integrating reduced tillage and green manures for sustainable organic cropping systems

TILMAN-ORG

TILMAN-ORG
A European Network



Aim of the project:

To design cropping systems that enhance productivity and nutrient use efficiency, show efficient weed management, increased biodiversity and lower carbon footprints.

Introduction

The overall goals of the project are to design improved organic cropping systems with enhanced productivity and nutrient use efficiency, more efficient weed management and increased biodiversity, but lower carbon footprints.

Background

Reduced tillage and green manuring are environmentally friendly practices that increase levels of soil organic matter and biological activity, improve soil stability, reduce fuel consumption, and the climate impact of crop production. The avoidance of deep ploughing is successfully practised as no-tillage agriculture in conventional farming systems. However, these no-tillage systems rely on herbicides for weed control and mineral fertilisers for plant nutrients. As these inputs are banned in organic farming the TILMAN-ORG project focuses on efficient weed management strategies and improvement of nutrient management.

Benefits of the project

TILMAN-ORG will contribute to overcoming farmer concerns about the agronomic and economic viability of conservation agriculture practices within organic farming systems. It will provide new strategies for increasing yields while maintaining soil quality in different organic crop systems/rotations and pedo-climatic conditions found in Europe.

For society, TILMAN-ORG will highlight strategies to prevent degradation of European agricultural soils, will enhance the C sequestration and storage potential of arable soils, and will lead to increased biodiversity in arable cropping systems at the below- and aboveground level.

For science, TILMAN-ORG will provide better estimates of how reduced tillage systems under organic farming practices can mitigate climate change. The project will deliver scientifically validated decision-support tools, and guidelines on most suitable agronomic practices and approaches, techniques and technologies

Expected results



TILMAN-ORG will summarize the existing knowledge and experiences on reduced tillage and green manures in organic systems in a wide range of soils and climates across Europe.

It will identify innovative approaches to weed control by integrating management techniques such as green manures, mechanical weeding and crop diversification, while evaluating impacts on weed diversity and their functional role in agro-ecosystems.

It will increase the efficiency of nutrient use by green manures (including N₂-fixing legumes), thereby reducing off-farm inputs. It will help to calibrate the farmers' decision support tool NDICEA to assess the effects of reduced tillage options and green manuring on N cycling and C pools.

The project will design viable organic cropping systems applying reduced tillage and green manures at the farm level for major European regions.

Expected long-term impacts

An expected long-term impact will be a functioning network of researchers and farmers to continue to develop reduced tillage techniques after the lifetime of TILMAN-ORG. Moreover the handbook of method elaborated in TILMAN-ORG will contribute to more standardized methods within the scientific community. The data base on results of long-term trials on reduced tillage, green manure and organic fertilization strategies will be in use also after project end. We expect that a considerable number of farmers will adopt some aspects of reduced tillage and the strategic use of green manures in their cropping systems. Moreover we expect that our research will influence subsidy schemes at the national and European level, where conservation techniques shall be integrated in natural resource protection programs.

Target groups

The project's dissemination activities will target farmers, advisors, and the scientific community, but also the agricultural support industries and policy makers. The main innovative strategy of the project is to adapt conservation agriculture approaches to organic farming drawing on existing field experiments and existing practical experiences across Europe.

Main activities



Optimum techniques for reduced tillage and green manures in organic systems will be identified using an integrated approach:

1. Farmers' experiences and perceptions will be assessed. Existing data from medium and long-term trials provided by the consortium and the existing literature will be evaluated.
2. Experimental case studies will be carried out. a) Carbon stocks and N₂O emissions under reduced tillage compared to ploughing will be measured. b) Studies on the functional biodiversity of weed populations and weed control will be performed. c) Research on the more strategic use of green manure in reduced tillage systems will be implemented. Data from long-term tillage trials across Europe will be exploited to calibrate NDICEA, a decision support tool to predict soil organic carbon and nitrogen fluxes in the soil-plant system.
3. Optimised cropping systems will be designed by modelling and prototyping approaches based on results from the farm survey, literature and case studies.

Related projects

7th Framework Programme for Research and Technological Development of the European Union

- NUE-CROPS - Improving nutrient



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use efficiency in major European food, feed and biofuel crops to reduce negative environmental impacts of crop production, <http://research.ncl.ac.uk/nefg/nuecrops>

- N.TOOLBOX - Toolbox of cost-effective strategies for on-farm reductions in N losses to water, <http://research.ncl.ac.uk/nefg/ntoolbox>
- SOLIBAM - Strategies for Organic and Low-input Integrated Breeding and Management, www.solibam.eu
- OSCAR - Optimising Subsidiary Crop Applications in Rotations (OSCAR), <http://web3.wzw.tum.de/oscar>

Further European programmes

- OPTIBIOGAZ: INTERREG IV-A Great Region www.optibiogaz.eu
- REDBIO: INTERR EG-EU www.redbio.net

National funding sources

- KLINE-AG: Coop Sustainability Fund <http://www.fibl.org/de/schweiz/forschung/bodenwissenschaften/bw-projekte/kline.html>
- NITBIO Italian Ministry for Agriculture http://www.sinab.it/sinab_plus/nitbio--interventi-agronomici-atti-ad-ottimizzare-la-ricerca,190,190,289.htm
- PEPITES: Agence National de la Recherche <http://www.projet-pepites.org/>
- Bionet: BMLFU www.bio-net.at
- BoFru: BLE, BÖLN www.bodenfruchtbarkeit.org/

Project dissemination

Our communication channels include: (a) the project website: www.tilman-org.net. The dissemination leader prepares text and audio visual media to the partners for adaption and dissemination at national level. Three articles in English, targeted to consumers, farmers and end users will be provided. (b) All articles in conference proceedings and peer reviewed publications will be archived on Organic Eprints, (c) a project brochure, (d) technical leaflets to be translated/ adapted to national conditions.

How to reach the endusers

The assessment of farmers' experiences and perceptions is an important part of the project. These practical experiences will be an important part for dissemination and completed with the findings of the literature, experimental case studies and the modelling approaches. A technical leaflet will provide a synthesis of all aspects.

Further information

This project is funded via the ERA-net CORE Organic II by national funds to each partner. CORE Organic II is a collaboration between 21 countries on initiating transnational research projects in the area of organic food and farming. In 2011, CORE Organic II selected this project and 10 more for funding.

Read more about the project at: <http://www.tilman-org.net/> or at the CORE Organic website: <http://www.coreorganic2.org/TILMAN-ORG> and in Organic Eprints: <http://orgprints.org/view/projects/TILMAN-ORG.html>