



Innovative systems for organic greenhouse production: transnational European Project just ended

The GREENRESILIENT project (Organic and bio-dynamic vegetable production in low-energy GREENhouses – sustainable, RESILIENT and innovative food production systems), which ran from April 2018 to October 2021, demonstrates that an agroecological approach to greenhouse production is feasible and allows the establishment of robust agroecosystems in different European areas.

The project brought together researchers from eight European countries (Austria, Belgium, Denmark, France, Italy, The Netherlands, Sweden, Switzerland) to test agroecosystems in protected conditions. Using systems approaches, partners compared innovative production systems against more intensive so-called “business as usual” systems at [five experimental sites](#) (Belgium, Denmark, France, Italy and Switzerland) to identify which systems were able to maintain high and stable production with low environmental impacts.

The innovative systems were selected primarily based on agroecological practices usually implemented in open field conditions at different latitudes (extended crop rotations, intercropping, transfer mulch, short term green manure species, flower strips, etc.). The systems were evaluated on the basis of the agronomic results, the availability of nutrients and their synchronization with the plant needs, the microbial biomass and activity, the belowground (nematode and microbial) and aboveground (soil arthropods and spontaneous flora) diversity. A [life cycle assessment](#) (LCA) was conducted to assess the environmental impact of the various products and systems at the five experimental sites, during their entire life cycle.

A huge amount of data has been collected by the project partners and results were presented and discussed during the last Greenresilient meeting held in Rome on the 21st and 22nd of September 2021. Without detailing all of the results obtained, some considerations can be made:

- the introduction of winter leafy crops in the rotation is a viable option for frost-free greenhouses in the winter months as frost resistance of different cultivated species was confirmed. However, it is important that these crops are [sown at the right time](#) in order to guarantee an adequate and sustainable yield during winter;
- crop diversification and alternative fertilization strategies in innovative systems sustained crop productivity without significant yield losses compared to business as usual (BAU) systems. However, they did not consistently result in higher nitrogen utilization in the short-term;
- Agroecological service crops (ASCs) introduced in innovative systems increased plant nitrogen availability in the plant-soil system in all trial locations and cropping systems.

- The introduction of ASCs promoted the presence and diversity of weeds in the rotation, while not presenting an increased risk of competition with crops. Similarly, the introduction of new management systems resulted in a higher diversity of weeds with less dominance of few species.
- a comprehensive survey of microbial and nematode biodiversity and community structure showed some signs indicating shifts of functional groups during the two-year period of observation.

The project produced a series of innovative factsheets and videos, which provide practical information in several languages:

Factsheets

- [Flower strips: a tool for pest control in greenhouses](#)
- [Transfer mulch in organic greenhouses](#)
- [Taste of Winter: tips and recipes for winter leafy greens](#)
- [Wintamines: how to grow winter vegetables](#)
- [Nematodes as suitable indicators for soil health](#)
- [Agroecological service crops in Southern European greenhouse](#)

Videos

- [How to assess weed biodiversity: exploiting weeds' functionality in greenhouses](#)
- [How to monitor soil health with DNA-metabarcoding of Nematode communities](#)
- [Innovative production in the greenhouse: flower strips, mixed crops, plant mulch](#)
- [How to set a pitfall trap to assess spiders and predatory beetles](#)

All project publications are available on [organic eprints](#).

More information can be found at the project website: www.greenresilient.net

Contact

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More about Greenresilient and CORE Organic

The CORE Organic Cofund transnational project GREENRESILIENT, aiming at demonstrating the potential and feasibility of an agroecological approach to organic greenhouse production, was launched on April 2, 2018. After 42 months it ended on October 1, 2021. The project has twelve partners from eight countries across Europe.

CORE Organic Cofund is a project in the framework of the European Union's ERA-NET scheme - a network of European ministries and research councils funding research in organic food systems



at national levels. The main focus of ERA-NET is to join forces and fund transnational research projects and support a focused and coordinated research and innovation effort covering the most important challenges along the organic value chains.

Project partners

Agroscope, Switzerland
Department of Food Science, Aarhus University (AU-FOOD), Denmark
Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria (CREA), Italy
Research Institute of Organic Agriculture (FiBL), Switzerland
Research Group for Organic Farming (GRAB), France
Horticultural College and Research Institute (HBLFA), Austria
Institute for Agricultural and Fisheries Research (ILVO), Belgium
La Colombaia, Italy
Vegetable Research Centre Kruishoutem (PCG), Belgium
Swedish University of Agricultural Sciences (SLU), Sweden
Institute for Biodiversity and Ecosystem Dynamics (UvA), Netherlands
Stichting Wageningen Research, Research Institute Wageningen Plant Research (WUR), Netherlands

Project website

www.greenresilient.net

About CORE Organic Cofund

www.coreorganiccofund.org