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Greenresilient: agroecological approach to organic greenhouse production in Europe

Fabio Tittarelli

CREA-Centro di ricerca Agricoltura e Ambiente (CREA-AA)

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GREENRESILIENT: AGROECOLOGICAL APPROACH TO ORGANIC GREENHOUSE PRODUCTION IN EUROPE

Abstract

GREENRESILIENT transnational project demonstrates the potential and feasibility of an agroecological approach to organic greenhouse production. It allows the build-up of robust agroecosystems adapted to local climatic conditions in different European areas, with regard to both productivity and sustainability from an agronomic and environmental point of view.

Extended abstract

Greenhouse production has always been considered as a production system at high level of intensification to compensate high investment costs and to guarantee out of season production in any climatic condition.

According to the Expert Group for Technical Advice on Organic Production of the European Commission (EGTOP), also some organic greenhouse production systems are very intensive. This threatens their sustainability and the public trust in organic greenhouse production (EGTOP, 2013). Nevertheless, the implementation of more resilient production systems, based on low energy consumption, appropriate crop rotation, use of agroecological service crops (ASCs) and local organic amendments, is possible at almost any latitude in Europe. The challenge is to design resilient, sustainable and local systems for year- round production of high quality and tasty vegetables in unheated and low-energy greenhouses or poly-tunnels for different European areas, while at the same time maintaining soil health and improving soil fertility.

Many different agricultural practices can contribute to a robust agroecosystem: (i) the selection of species and varieties that are resistant and resilient to local pests and diseases as well as to local climate conditions (Theurl et al., 2017); (ii) the cultivation of ASCs with multiple benefits such as providing N and organic matter to the soil, controlling soil-borne diseases and plant-parasitic nematodes while hosting pollinators and predators of aboveground pests and diseases; (iii) the use of wide crop rotations (including two or more cash crops per year) involving different botanical families and crop associations, to reduce pest and disease pressure on cash crops; (iv) the regular

application of appropriate quantities of organic matter (i.e. compost, green manure or farmyard manure) to the soil to promote soil microbial diversity and soil disease suppressiveness.

The build-up of robust agroecosystems has always been intended as a prerogative of open field agriculture. Under protected conditions (greenhouse, polytunnel), some of the agroecological practices outlined above are not taken sufficiently into account because they are considered as economically non-sustainable (Tittarelli et al., 2017).

Agroecology, according to the more recent literature on this subject (Francis et al, 2003; Gliessman, 2016), cannot be considered just as a set of agronomic practices used to apply the principles of ecology to agricultural systems, but as a tool to re-design the entire food production system. If the focus of agroecology were only on the efficacy of some agricultural practices in preventing plant diseases or improving soil fertility, its capacity of analysing current industrial food system and of designing alternatives would be strongly limited. Whatever are the agronomic tools we utilize, they can never compensate the huge amount of energy spent and waste produced by processing, packaging and transportation in an industrial food system. For this reason, an agroecological approach to research requires multidisciplinary competences ranging from agronomy, soil chemistry, plant pathology, entomology, weed science, rural sociology. The main aim of the transnational project GREENRESILIENT is to demonstrate the potential and feasibility of an agroecological approach to organic greenhouse production. The project consortium is composed by scientists with multidisciplinary competences from eight countries with relatively large areas of certified organic production.

The project activities are organized, as detailed below, in five Work Packages (WP):

WP1 - Scientific and administrative coordination and quality control (CREA-AA, IT)

WP2 - Resilient cropping systems (AU-FOOD, DK)

WP3 - Crop yield, nutrients availability and soil fertility assessment (ILVO, BE)

WP4 - Soil health and functional biodiversity (SLU, SE)

WP5 - Communication, actors' involvement and sustainability assessment (FiBL, CH)

The main expected result of GREENRESILIENT is the definition of innovative and resilient protected cropping systems for Mediterranean, Central and Northern European certified organic production. While in Central and Northern European countries, the major challenge is to produce in low-energy systems under low temperature and low light conditions, the main challenge in Mediterranean countries is to reduce the use of plant protection products (for example copper) as much as possible. The use of agroecological practices in intensive organic greenhouse production systems represents an innovative approach to a traditionally intensive and mainly conventionalised system of organic production. Environmental and economic sustainability of the different cropping systems will be assessed using Life Cycle Assessment (LCA) calculating the environmental impact of two “extreme” strategies within the five experimental sites of the project.

Another important objective of GREENRESILIENT project is to implement the concept of “Food Citizenship”, making consumers aware of how their food is grown and how they can take responsibility for purchasing local food. Consumers will be involved in different ways. Information on which crops can be grown all the year round in unheated (including frost-free) greenhouses in the different regions will be gathered and displayed in ways which are easy to communicate (e.g. infographics).

References

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