

“Comparing the usefulness of assessment tools in evaluating the environmental impacts of organic greenhouse horticulture”

Short-Term Scientific Mission, EU COST Action FA1105
IRTA (Institut de Recerca i Tecnologia Agroalimentàries)
Cabrils, Barcelona (Spain)

Lucia Foresi
PhD Researcher, CAWR
foresil@uni.coventry.ac.uk

Background

Mission

- Part of EU COST Action FA1105 “Towards a sustainable and productive EU organic greenhouse horticulture” (2012-2016)
- Short-Term Scientific Missions – opportunities for young researchers to work on a specific subject in a foreign institution (networking, knowledge exchanging, collaboration)

PhD

- Main focus – to find comprehensive methods to evaluate resilience and sustainability in organic greenhouse horticulture
- Many different tools developed world-wide to make such evaluations for farming systems
- For this mission: Life Cycle Assessment (LCA) and Public Goods tool (PGT)

Mission's Main Objectives

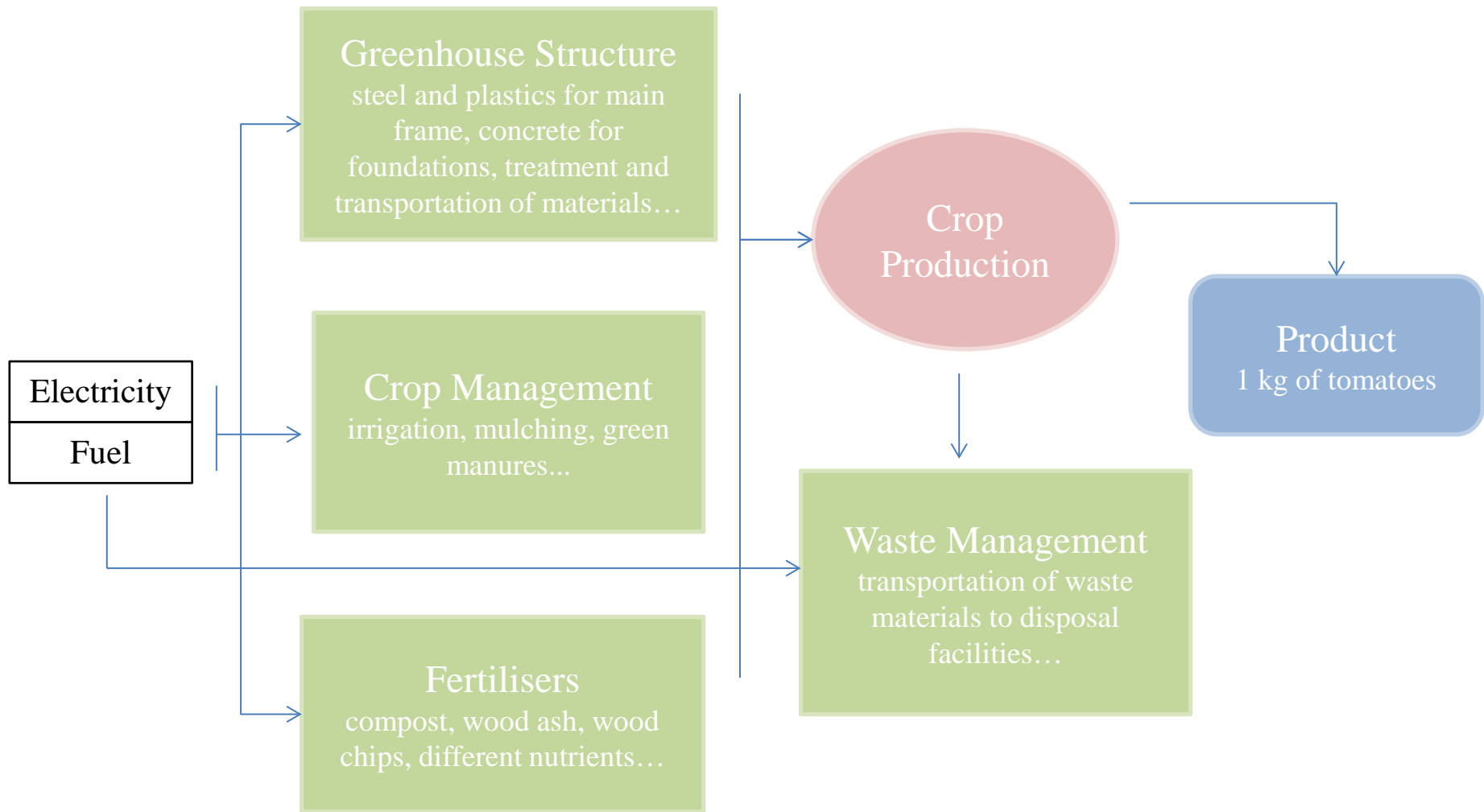
- Gather theoretical knowledge on Life Cycle Assessment (LCA)
- Study the potential application of LCA to organic greenhouse horticulture, since there is no specific tool to assess its sustainability
- Compare LCA with Public Goods tool (PGT) to evaluate the possibility of integration between them
- Summarise the results and present them in a scientific paper, as a contribution to the 3rd International Symposium on Organic Greenhouse Horticulture (Izmir, Turkey – April 2016)

Work Stages

- Study of Life Cycle Assessment (LCA) tool (Excel-based environmental simulator developed through the EUphoros project, 2008-2012)
- Update of said LCA worksheet (i.e. impact categories, characterisation factors, databases), with the support of SimaPro 8 software, and implementation of initial data sheet with aspects related to organic greenhouses (i.e. type of structure, materials, fertilisers, transport and waste disposal)
- Comparison with Public Goods tool (PGT, developed by the Organic Research Centre, Newbury [UK], 2011), to highlight differences and potential common points
- Application of LCA to a case study, already assessed with PGT, to compare results (Tolhurst Organics, Hardwick, Reading, UK – *stockfree horticultural farm*)

Life Cycle Assessment

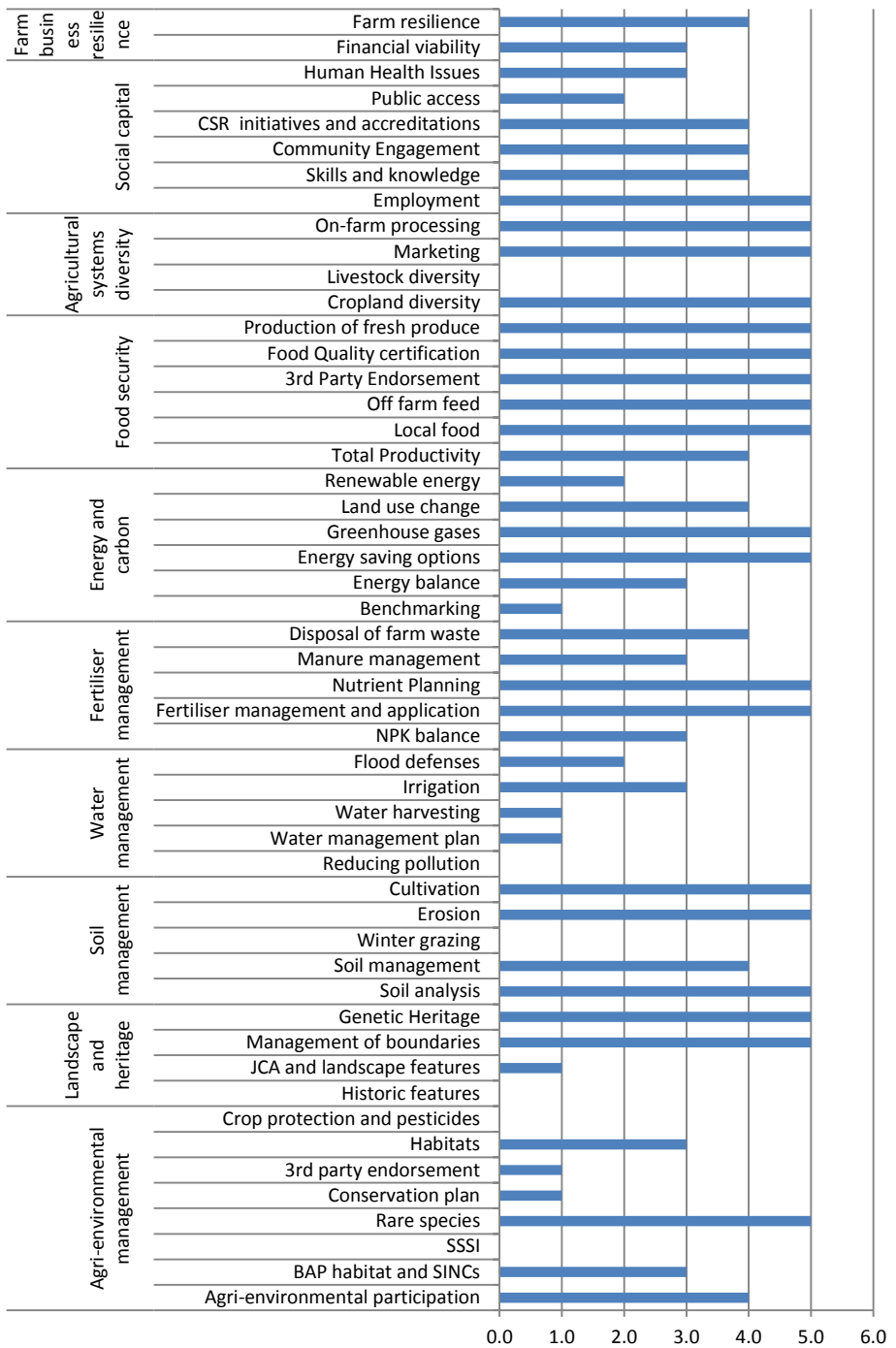
- Evaluation of environmental impacts of a product/process/service from a cradle-to-grave point of view
- Economic and social aspects not always included
- Four stages: 1) definition of objectives, 2) assembly of inventory, 3) actual impact assessment, 4) interpretation of results
- Functional Unit (FU) → focus of the assessment (mathematical reference for all inputs and outputs; i.e. in agriculture, usually a unit of yield [ton or kg] or area [m² or ha])
- Methodologies and databases widely recognised and used



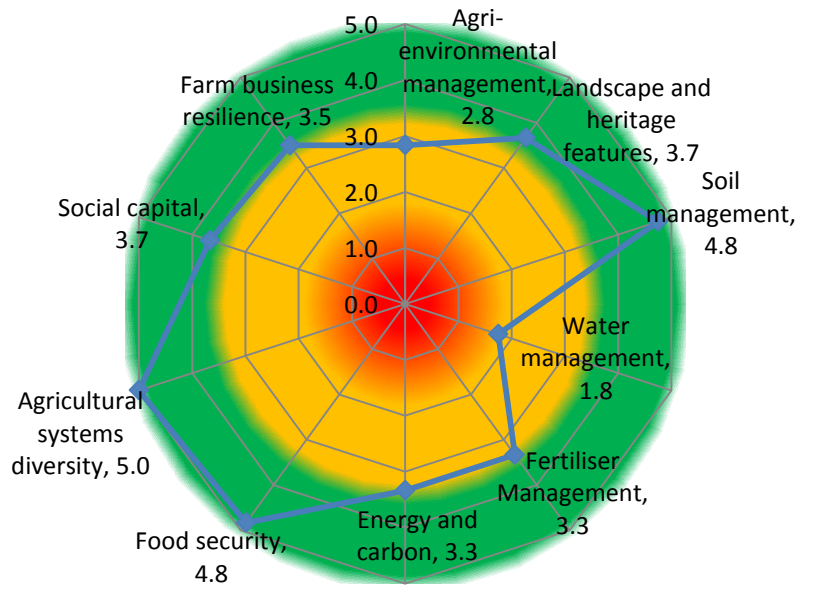
System diagram of the case study (Tolhurst Organics, Hardwick, Reading, UK), assessed with LCA (2015).

Public Goods Tool

- Excel-based tool developed to define what kind of “public goods” a farm can provide beyond simple production
- Social and economic aspects also considered
- Identification of 11 key aspects (“spurs”): soil management, biodiversity, landscape and heritage, water management, nutrients management, energy and carbon, food security, agricultural systems diversity, social capital, farm business resilience, animal welfare
- For each spur, a set of questions (“activities”) was selected in order to balance the need for in-depth data and the time spent for the assessment [quantity vs quality] (2-4 hours)
- Each activity gets a score between 1 (lowest) and 5 (highest), and for each spur all scores are averaged and then shown through a radar graph



Final results and radar graph of the case study (Tolhurst Organics, Hardwick, Reading, UK), assessed with PGT (2015).



Results Obtained

- Updated and improved version of the LCA Excel-based tool with:
 - four main worksheets (i.e. Instructions, Input Data, Detailed Results, Total Results)
 - Database with default data and Inventory with the information needed for the actual assessment
 - a set of basic impact categories (i.e. climate change, acidification, eutrophication, particulate matter, resource depletion) as a starting point for future evaluations of different farming systems (organic greenhouse horticulture included)
- Case study assessed with two different methods → integrated discussion on possible farm improvements (i.e. quantitative data on productions and use of natural resources and qualitative evaluation of farming practices)

Final Observations

- Initial data collection → longest phase of the assessment in both cases
- Both applicable to big farming systems (large productions)
- Difficulties for application to local situations and/or small farms for LCA (global / international / national databases)
- Major difference in **use of data**: exclusively quantitative for LCA, mix of quantitative and qualitative for PGT
- Neither dedicated to organic greenhouse horticulture, but “modifiable” according to need (i.e. choice of data as “specific” as possible, especially for LCA)

Further Research

- Potential addition of economic and social aspects to LCA (social harder to “quantify” than economic)
- Possible integration of PGT with more specific data on organic greenhouse horticulture (i.e. types of structure and materials; potentially, extra Excel worksheet)
- Collection of more data on organic farming for LCA
- Need for local / regional databases for LCA (i.e. representative case studies, to be used as references)

***Fieldwork 2016: looking for UK organic growers to participate!**

Thank you for your attention.