Organic World Congress 2020 | FRANCE

SEPTEMBER 21ST TO 27TH, 2020 IN RENNES
AT THE COUVENT DES JACOBINS • RENNES MÉTROPOLE CONFERENCE CENTRE
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OWC 2020 Paper Submission - Science Forum

Topic 3 - Transition towards organic and sustainable food systems

OWC2020-SCI-289

INTEGRATED ANALYSIS OF THE IMPACTS OF ORGANIC FARMING AT FARM AND FOOD SYSTEM LEVEL IN LUXEMBOURG

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Preferred Presentation Method: Oral or poster presentation

Full Paper Publication: Yes

Abstract: The Luxembourg government aims to achieve 20% organic agriculture until 2025 and 100% organic agriculture until 2050. The aim of the project is to analyse the impact such a change will have at the farm, as well as on the food system level in Luxembourg. This will be done by conducting a sustainability assessment at the farm-level and the food system-level. For the farm-level sustainability assessment, farm management systems and their respective sustainability implications according to the FAO SAFA Guidelines (Guidelines for the Sustainability Assessment of Food and Agriculture Systems) will be assessed using the SMART-Farm Tool. At the food system-level, the mass-flow model of the agriculture and food sector Soil and Organic Livestock (SOL)-Model will be employed to analyse the environmental implications of dietary patterns and agriculture production systems, where the data from the farm-level assessment will be used to increase specificity of the scenarios.

Introduction: The intensification of the agricultural system over the past 50 years, while greatly increasing food availability, entailed considerable adverse environmental impacts. Changes in farm management are needed to align environmental protection goals with food production needs. It is often proclaimed that this can be achieved with a switch towards organic agriculture. This is why the Luxembourgish government has set the new goals to achieve 20% organic agriculture until 2025 and 100% organic agriculture until 2050 (Gouvernement du Grand-Duché de Luxembourg, 2018). In 2017, only 4.2% of the Luxembourg agricultural area was farmed organically (Eurostat, 2019).

The aim of the project is to analyse the impact such a change towards organic farming will have at farm and food systems level in Luxembourg. The following research questions arise:

1. How does farm management (organic/conventional) impact economic, social and environmental sustainability?
2. How does a change towards organic agriculture impact different environmental parameters of the Luxembourg food system?

Material and methods: The sustainability of the Luxembourgish food system will be assessed on two levels: the farm-level and the food system-level.

For the farm-level sustainability assessment, farming practices of 85 farms and their respective sustainability implications according to the FAO SAFA Guidelines (Guidelines for the Sustainability Assessment of Food and Agriculture Systems) will be assessed using the SMART-Farm Tool (Schader et al., 2016). The impact of management system (conventional or organic) on the SAFA-goal achievement will be studied. The statistical tests will be chosen depending on the normality of the data:

I. Comparison of results of organic and conventional farms on the sub-theme level

a) Independent two sample t-test in case of normal distribution

b) Mann-Whitney-U test in case of not normal distribution

II. Identification of indicators responsible for possible significant differences in I.

III. Correlation analysis between dimensions and sub-themes depending on management system

a) Pearson correlation in case of normal distribution

b) Spearman rank-correlation in case of not normal distribution

Furthermore, the collected data on farming practices, as well as the identified trade-offs and synergies will be used in the food system-level sustainability assessment for Luxembourg.

At the food system-level, the mass-flow model of the agriculture and food sector Soil and Organic Livestock (SOL)-Model (Muller et al., 2017) will be employed to analyse the environmental implications of dietary patterns and agricultural production systems. Different future farming practices and dietary patterns scenarios for Luxembourg in the year 2050 will be defined and used to predict their environmental impacts (on e.g. greenhouse gas emissions, land occupation, nitrogen surplus, phosphorous surplus, non-renewable energy demand, pesticide use, water use and erosion potential).

I. The data from the farm-level sustainability assessment and the therein identified current farming practices in regards to crop production and animal husbandry will be used in the definition of a baseline scenario for the Luxembourgish food system.

II. A reference scenario for the Luxembourgish food system in 2050 will be identified, serving for comparison with other future scenarios.

III. A set of other scenarios comprising larger changes in dietary habits and farming practices will be developed, including scenarios with 100% organic agriculture. The strategies to achieve these changes can be grouped in the 3 main categories: efficiency strategies, sufficiency strategies and consistency strategies. These strategies will be considered together and as complements of each other in the specification of possible future scenarios. These changes will be mainly demand-driven, supply-driven or driven by optimising certain target variables, e.g. average global temperature.

Results: The expected results are identification of the current sustainability level according to the FAO SAFA Guidelines of the Luxembourgish agriculture sector. The deeper analysis of these results will allow the identification of the impact the management systems has on the economic, social and environmental sustainability at farm level as well as assess possible synergies and trade-offs between different dimensions and themes of sustainability. Results of the farm-level sustainability assessment will be presented at the conference.

Moreover, the environmental impacts a change toward organic farming will have on the Luxembourg food system will be identified in the second part of the project, using SOL-m.

Discussion:

Acknowledgements

The project SustEATable is funded by the Ministry of the Environment, Climate and Sustainable Development and by the “Œuvre Nationale de Secours Grande-Duchesse Charlotte” and supported by OIKOPOLIS S.A. and BIOGROS S.A. The authors would like to thank all the participating farmers as well as the Sustainable Food Systems Ltd. for their support with the SMART-Farm Tool.

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Disclosure of Interest: None Declared

Keywords: Food system, Luxembourg, organic farming, SMART-Farm Tool, Sustainability assessment