

CASE STUDY 9

Improving agro-ecological wheat production by application of different sources of green manure

Bauwens Lieven¹ & Waeyenberge Lieven².

¹Pomona, ²EV-ILVO.

Case-study 9 is organised by Pomona and ILVO (Flanders Research Institute for Agriculture, Fisheries and Food). Pomona is a consumer-driven cooperative agroforestry farm applying a sustainable agricultural management (agro-ecological farming). The concept aims at a perfect balance between a fully developed ecosystem at one hand and a crop production with a profitable income at the other hand, fully aligned with the needs of the consumers. EV-ILVO performs international, multidisciplinary and innovative research targeting an economically, ecologically and socially sustainable agriculture and fisheries in a from-farm-to-fork approach. EV-ILVO already has build up ample experience in setting-up and maintaining field trials.

Case-study 6 is positioned in the Atlantic Central pedoclimatic region, more precisely in the province of East-Flanders in Belgium (GPS coordinates: 51°16'03.5" N, 4°11'03.6" E). The climate is warm and temperate (mean annual temperature 10.5-11 °C, mean annual precipitation 800-900 mm). The soil type of the field is classified as 'Pep' (texture class light sandy loam, drainage class wet and no soil profile development). Such soil types are normally wet and suffer from flooding's during winter time. They dry late during springtime but remain moisture during summer time.

 This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817819



Objective

A questionnaire and regional discussion group meetings with stakeholders and end-users revealed and prioritised the main threats affecting the agro-ecosystems of the Atlantic Central region and the qualitative assessment of their severity. Use of chemical fertilizers and liquid manure or slurry still cause a too large leakage of nitrate and phosphate in surface water and groundwater, intensive management regimes cause a deficit of soil organic matter, and a general drop of 'soil health', recognized by degraded biological and structural conditions, causes additional problems like soil erosion and water shortage.

Field experiments have been established to test different management practices for wheat, potatoes and vegetables in order to address the above mentioned agricultural threats. Especially attention is paid to soil fertility, organic matter content and biodiversity in each case-study in a different way: case-study 6 will investigate the combined effect of with and without 'brown' material co-composted farm yard manure and a differential management of the cover crops (incorporation or mowing), case-study 7 will focus on the effect of cover crop mixtures which will diversify further the cropping system (from simple till 12 species mixtures), case-study 8 will compare different agricultural systems (intensive versus extensive, conventional versus organic), and case-study 9 will investigate the use of different organic fertilization sources like farm yard manure, compost and fermented organic waste.

The obtained data of the case-studies will contribute to the analysis of the environmental and economic impact on a farm and regional level. This will finally result in the proper selection of the most promising crop diversification methods (including cover crops), organic fertilizers, and farming systems to enhance the functionality of soil macro- and microorganisms, responsible for enhancing soil health, crop productivity and other ecosystem services.

This poster presents case-study 9. The farming system is agro-ecological. The objective is to test different sources of locally produced organic fertilizer to increase the SOM content, ameliorate the soil's structure and improve plant health and development. Especially farmyard manure, compost and fermented organic waste (silage grass-clover) will be tested.

State of the art

In densely populated Flanders, the pressure on biodiversity has been too great for centuries. This makes it increasingly difficult to protect biodiversity and ensure the long-term survival of our ecosystems and the services they provide.

The biodiversity value of the intensive, homogeneous agricultural landscapes in Flanders is low. As well as further reducing the use of pesticides and fertilisers, there is a need to diversify production methods while giving farmers an active role in landscape management. Recently, farmers are voluntarily entering into more biodiversity-supporting management agreements and organic agriculture is also increasing in area. However, the proportion of the total area in both cases is still low.



Proposed practices

Agro-ecological farming relies on ecological processes to support the production system. It is a holistic way of thinking on agronomy, ecology and biology. Organic farming mostly applies composted or non-composted green manure to increase C-content, and improve the soil's structure. However, fermented organic waste has some additional advantages: improved microbial diversity and activity to produce natural antibiotics, essential vitamins and plant growth hormones; the soil's quality improves further and it gets more resilient against pests and diseases.

To investigate the impact of different sources of organic material on soil health, a field with an organic farming system, in combination with agro-forestry, will be divided into 4 equal parts. One part will not receive additional organic material, 3 parts will receive another source of green manure. A source of farmyard manure, compost and fermented organic waste, which was produced 'on farm' or locally, will be applied.

(See photos below, from left to right: application of farmyard manure, compost and fermented organic waste (silage grass-clover).

Problems to solve

Conventional farming depends on high amounts of external inputs of fertilizer because it negatively disturbs the soil's capacity to produce crops: nutrients get depleted, the SOM (soil organic matter) content decreases and the structure of the soil deteriorates. The proposed field trial wants to demonstrate that a sustainable way of farming is possible in combination with a reduced dependence of external fertilizers.

More precisely, with this experiment we hope to demonstrate that different sources of green manure exist as excellent alternatives to the conventional way of external inputs of nutrients. Also we want to demonstrate the potential of fermented organic waste on soil structure, SOM content and improved plant health.

Preliminary results

No results yet.

