



eip-agri
AGRICULTURE & INNOVATION

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Íñigo Virto
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13-14 April 2021

**EIP-AGRI Seminar 'Healthy soils for Europe:
sustainable management through knowledge and practice'**



EIP-AGRI Focus Group 26 - Moving from source to sink in arable farming

Main question & Process

Which cost-effective farm management practices and tools could foster and ensure long-lasting carbon storage in arable farming, contributing to climate change mitigation?

Background & relevance

- **Soil organic C stocks are altered by biotic activities of plants** (the main source of C through litter and root systems), **microorganisms, and 'ecosystem engineers'** (earthworms, termites, ants).
- **Abiotic processes** related to the soil-physical structure, porosity and mineral fraction **also modify these stocks.**
- **By acting on both biotic and abiotic mechanisms, land use and management practices drive soil spatiotemporal organic C dynamics.**

(Dignac et al., 2017)

- **Increasing soil organic matter stocks is important for climate change mitigation and adaptation, as well as for soil fertility and food security.**
- **Implementing management options** that allow increasing soil organic carbon stocks at the local scale **raises several questions: how can it be done, at which rates, for how long, where can this be done, which agricultural practices can make it possible?**

(Chenu et al., 2019)



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2017/11/29-30
Alicante, Spain

2018/06/13-14
Tüln, Austria

Starting paper** (K. Hedlund)

Overview of current knowledge & survey members FG

Examples from practice

Breakout sessions

- Identify practices, pros & cons
- Analyze economic & environmental impacts

4 areas:

- Amendments
- Crops & rotations
- Tillage
- Fertilization

6 Mini-papers:

Transforming arable land into a sink for C based on Conservation Agriculture

Tools to judge cropping systems performance on C storage in the soil.

Local and regional adaptation strategies to increase or maintain the content of C in soils under arable farming

Implementation/incentives/business/capital: What incentives can scale up successful cases with respect to C capture in soils?

How can we promote biomass return in soils?

Potential of organic amendments for C storage potential on arable soils.

* https://ec.europa.eu/eip/agriculture/sites/default/files/eip-agri_fg_carbon_storage_in_arable_farming_final_report_2019_en.pdf

** https://ec.europa.eu/eip/agriculture/sites/default/files/fg26_starting_paper_2017_en.pdf



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Final Report*

Brainstorming (Good practices)

- Keeping soil cover (cover crops, intercropping, agroforestry, etc)
- Return of locally produced biomass (compost, sludge, manure, ...)
- Reduced tillage & conservation agriculture

Presentation of mini-papers

Field Visit (Alfred Grand)

<https://grandfarm.at/?lang=en>

Interaction with 2 Operational Groups

- BIOBO Project (Optimizing tillage systems in Austria)
<https://boku.ac.at/en/nas/ifoel/arbeitsgruppen/ag-bodenfruchtbarkeit-und-anbausysteme/projekte/biobo>
- OG Optimizing catch crops in arable farming

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EIP-AGRI Focus Group 26 -

Main question & Process





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Key outcomes of the discussions

The Focus Group identified the following management practices that can capture CO₂ in agricultural soils in the long term, while improving soil quality:

- **Keeping the soil covered** (intercropping, cover crops, crop rotations (including perennials), agroforestry)
- Adding **organic matter amendments** from local sources.
- Reducing organic matter decomposition by **reducing soil disturbance** (reduced tillage and precision farming)
- Controlling soil moisture by **managing water use**.

Other issues:

- A **combination of several of these practices** is likely to be more effective
- Local conditions (climate, soil, crops ...) would also influence their effectivity: **local testing and adapting** of different combinations of practices would be useful.
- It is essential to **increase awareness among farmers and consumers** on the importance of capturing carbon, not just to **mitigate** climate change but also to **increase soil health and fertility**, and **adapting to climate change**.



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Main knowledge gaps identified to address the main question

Practitioners

- **Cover crops and associations** (benefits at cropping system level in different agronomic aspects: fertility, weed management, C storage, diseases, in the short and long-term)
- **Agroforestry** (good associations, methods to assess benefits from associations, ecosystem services, etc.)
- **Amendments** (local availability, best management practices, indicators in quality: not only nutrients but also microbiology, contaminants, C quality ...)
- **Soil biology involved in soil health** (the impact of soil biology in fertility and soil health: how to evaluate (soil biological indicators), methods & techniques to manage and enhance soil biology.
- **SOC & Plant Health** (not the disease perspective, but from the root of the problem).

Researchers

- Role of soil **amendments** and **root exudates** in **sustaining soil microflora** (multiple effects on C, N ...), including the *priming effect*.
- **Stoichiometry**: Interactions between SOC management and elements other than C (effects, counteractions and SOC dynamics)
- **Modelling: Landscape-scale** modelling of SOC, and including **soil management factors** (other than tillage and fertilization)
- **Carbon saturation** and optimal SOC content in different cropping systems and pedoclimatic conditions.
- Optimal use of **local biomass**, taking into account the **life-cycle analysis and total net effect on GHG emissions**.
- Links between soil characteristics, **soil biology and soil physics**
- **Multiple management** effects on SOC.
- **Socio-economical value** of soil C.



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Main innovative ideas or recommendations to address the knowledge gaps

- Raising awareness on benefits of soil C in agriculture
- Management suggestions:
 - Conservation agriculture
 - Organic amendments
 - Intercropping
 - Local adaptation strategies
- Ideas for Operational Groups:
 - Tools to assess SOC sequestration and benefits
 - Best practices and advisory service on irrigation and SOC sequestration
 - Cropping for climate-change adaptation
 - Local implementation of precision and conservation agriculture
 - Plant mixtures in crop rotations for different farming systems and regions
 - Agroforestry
 - Local use of biomass/crop residues/excess manure



Local adaptation strategies to increase or maintain soil organic carbon content under arable farming in Europe: Inspirational ideas for setting operational groups within the European innovation partnership

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<https://ec.europa.eu/eip/agriculture/en/focus-groups/moving-source-sink-arable-farming>

Gracias

Merci

Obrigado

Grazie

Hvala vam

Danke

Dank je

Tack

Dziękuję



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EIP-AGRI seminar

Healthy soils for Europe: sustainable management through knowledge and practice

Online – 13-14 April 2021

All information of the seminar is available on
www.eip-agri.eu

On the event webpage
<https://ec.europa.eu/eip/agriculture/en/event/eip-agri-seminar-healthy-soils-europe-sustainable>

