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Session 5: Bringing Carbon Farming from Science to Organic and Regenerative Farms:

Challenges and Solutions across Research, Markets, Farmer-Led Models and Policy

2nd European Carbon Farming Summit
4-6th March 2025
Dublin, Ireland

Organised by:

CREDIBLE EU carbon farming

ClimateKIC

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Science:
Critical insights into Carbon Farming

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www.fibl.org

Lin Bautze,
FiBL Schweiz

Market:
Market-Based Solutions and Farmer Challenges

regeneration.eu

Paul Martin,
ReGeneration

Bottom-up:
A Farmer-Led Support Model for Carbon Farming

PRODUTTORI AOR

produttoriaor.org

Chiara Michelone,
Produttori AOR

Policy:
Implementing carbon farming into policy

IFOAM ORGANICS EUROPE

www.organicseurope.bio

Hanna Winkler,
IFOAM Organics Europe

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Critical Insights into Carbon Farming

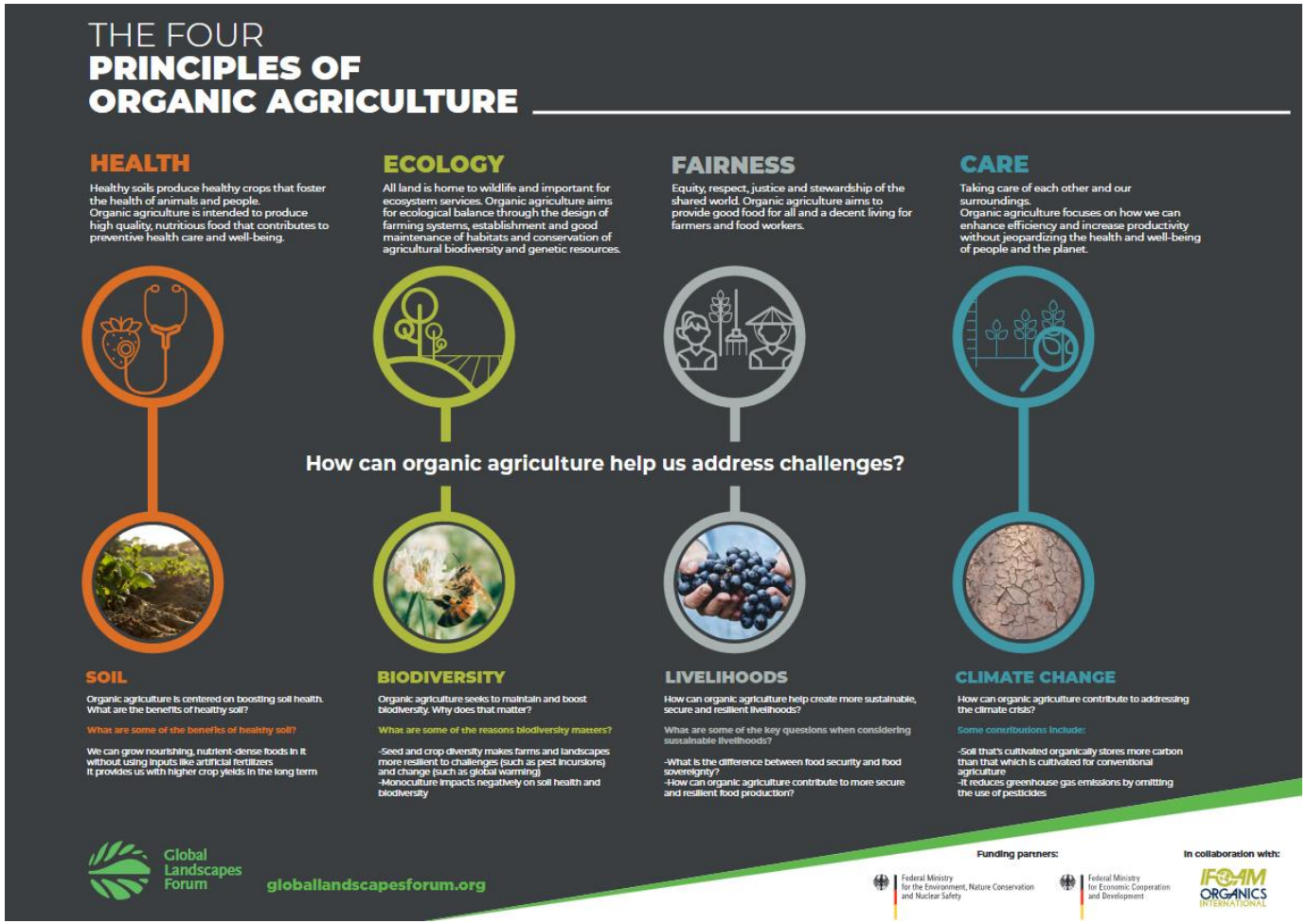
Bringing Carbon Farming from Science to Organic and Regenerative Farms

Carbon Farming Summit, Dublin

06.03.2025

Lin Bautze, Markus Steffens (FiBL), Wiebke Niether (Justus-Liebig University Giessen)

Relevance of Carbon Farming for Organic Agriculture



Organic agriculture has a long tradition and history related to soil health:

- recognition of soil as a living, dynamic system.
- soil organic matter (and thus soil carbon) and its role in maintaining its health and fertility.
- Research since the beginning on reduced tillage, composting, cover crops….and many other soil practices.
- Share expertise and pioneer approaches

https://www.globallandscapesforum.org/infographic/what-are-the-four-principles-of-organic-agriculture/

Relevance of Carbon Farming for Organic Agriculture

Challenges ahead:

- site-specific sequestration potential
- **additionality**
- permanence
- leakage effects and
- **risks** (e.g. herbicides for reduced tillage)

ELSEVIER

Journal of Environmental Management

Volume 330, 15 March 2023, 117142

Research article

Carbon farming: Are soil carbon certificates a suitable tool for climate change mitigation?

Carsten Paul [a], Bartosz Bartkowski [b], Cenk Dönmez [a i], Axel Don [c], Stefanie Mayer [d], Markus Steffens [e], Sebastian Weigl [a], Martin Wiesmeier [d f], André Wolf [g], Katharina Helming [a h]

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Highlights

- Soil-based carbon certificates are sold as voluntary emission offsets.
- Private certification schemes provide financial incentives for carbon farming.
- However, they are not a suitable tool for climate change mitigation.
- Permanence, additionality and monitoring are not ensured; leakage effects may occur.

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Relevance of Carbon Farming for Organic Agriculture

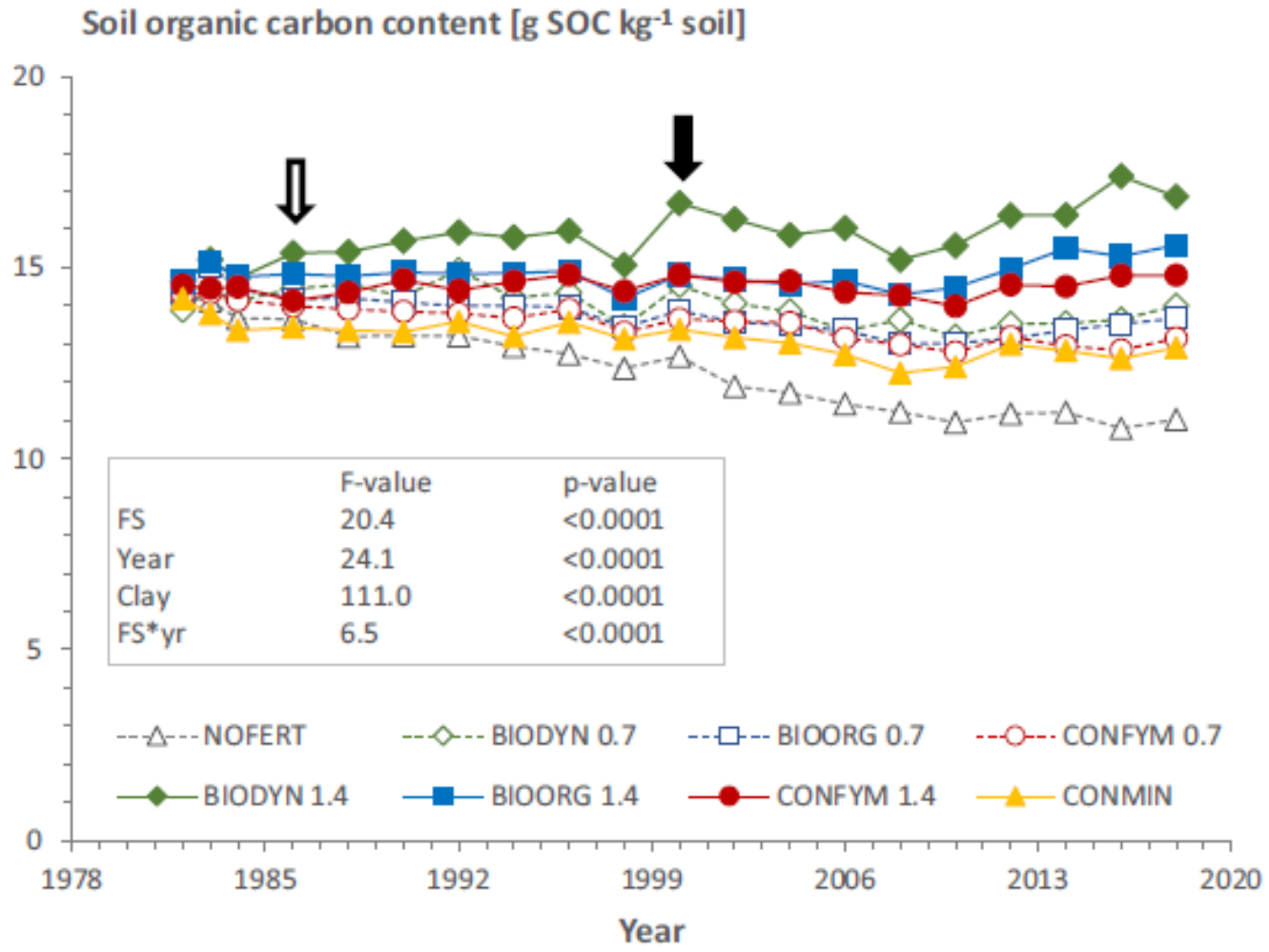
- **Additionality:** disadvantage of organic farmers applying carbon farming practices since many years → farmers need to decide for NEW practices!
- New practices should:
  - **not increase emissions (leakage effects)**….experiments and innovations are great, but holistic sustainability should be the goal!
  - Consider available **biomass flows**…where to receive the biomass e.g. for large-scale biochar applications?
  - **be measureable and representable** in models/carbon calculations….at the moment many innovations of organic farmers are not covered!

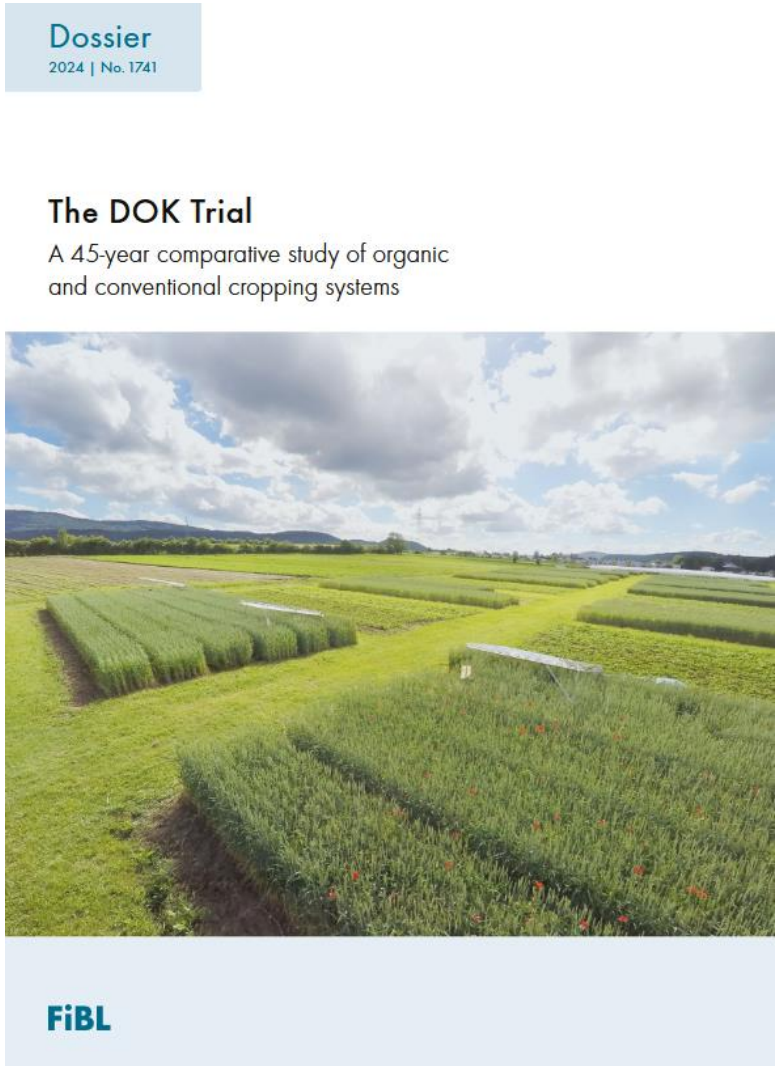
Relevance of Carbon Farming for Organic Agriculture

- **Expectation management -** communication to farmers should support the knowledge that:

  - **Maintaining SOM levels** instead of increasing it is the first goal
  - Carbon sequestration takes **time** → DOK results
  - **That credits will not save the climate** and → scientific challenges
  - That climate is **not the only relevant factor** → holistic sustainability and system thinking

Carbon Credits need a long-term perspective: DOK-trial





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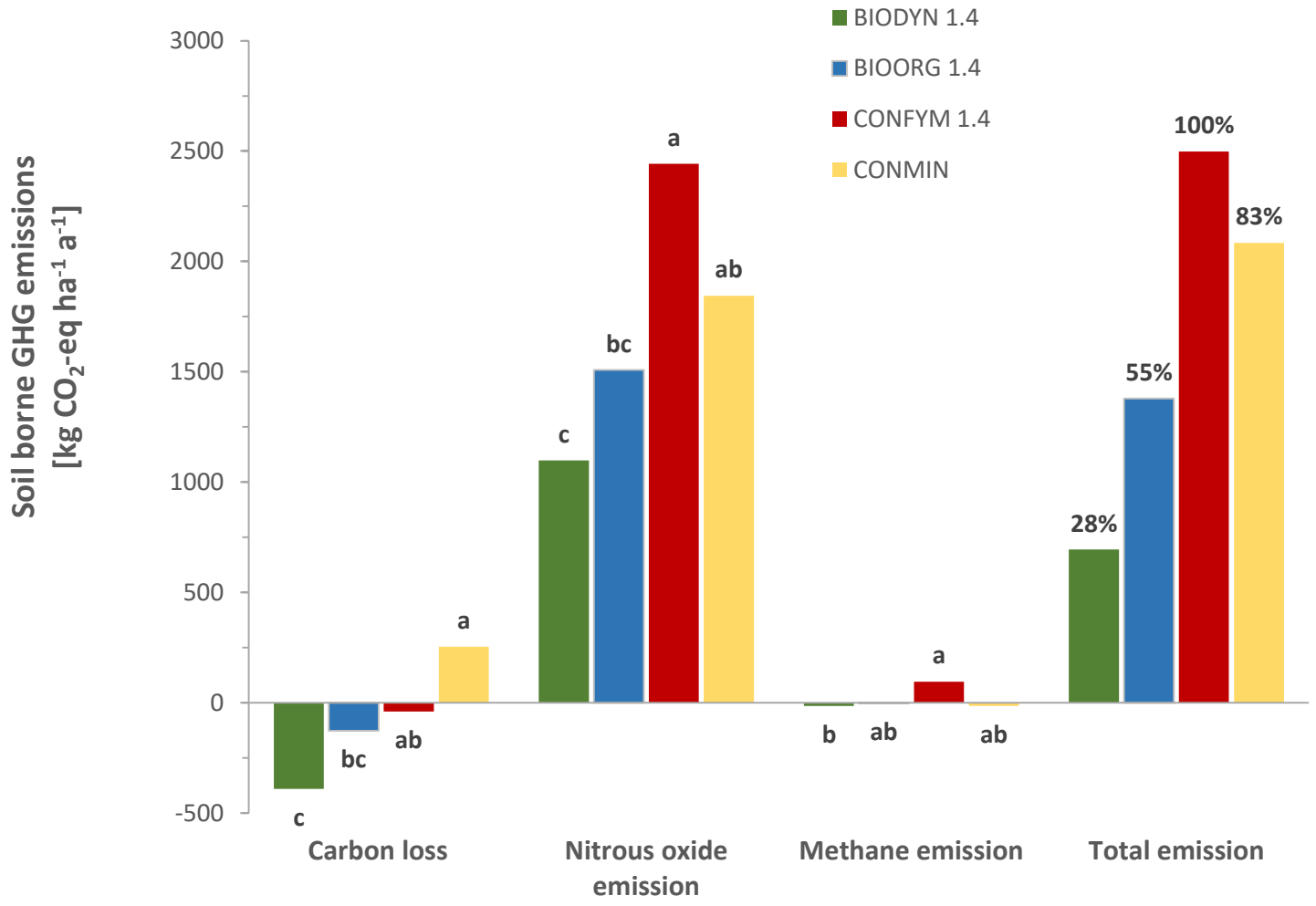
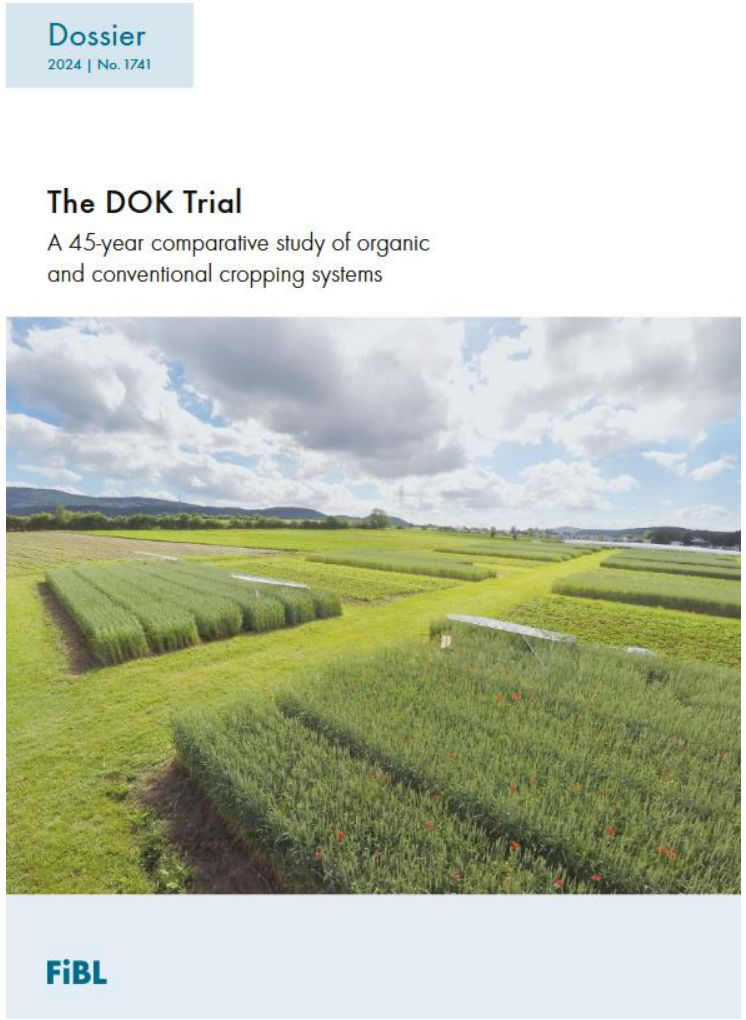
DOK-trial: Synthesis climate effect of organic agriculture





https://www.fibl.org/de/shop/1741-dok-dossier-en

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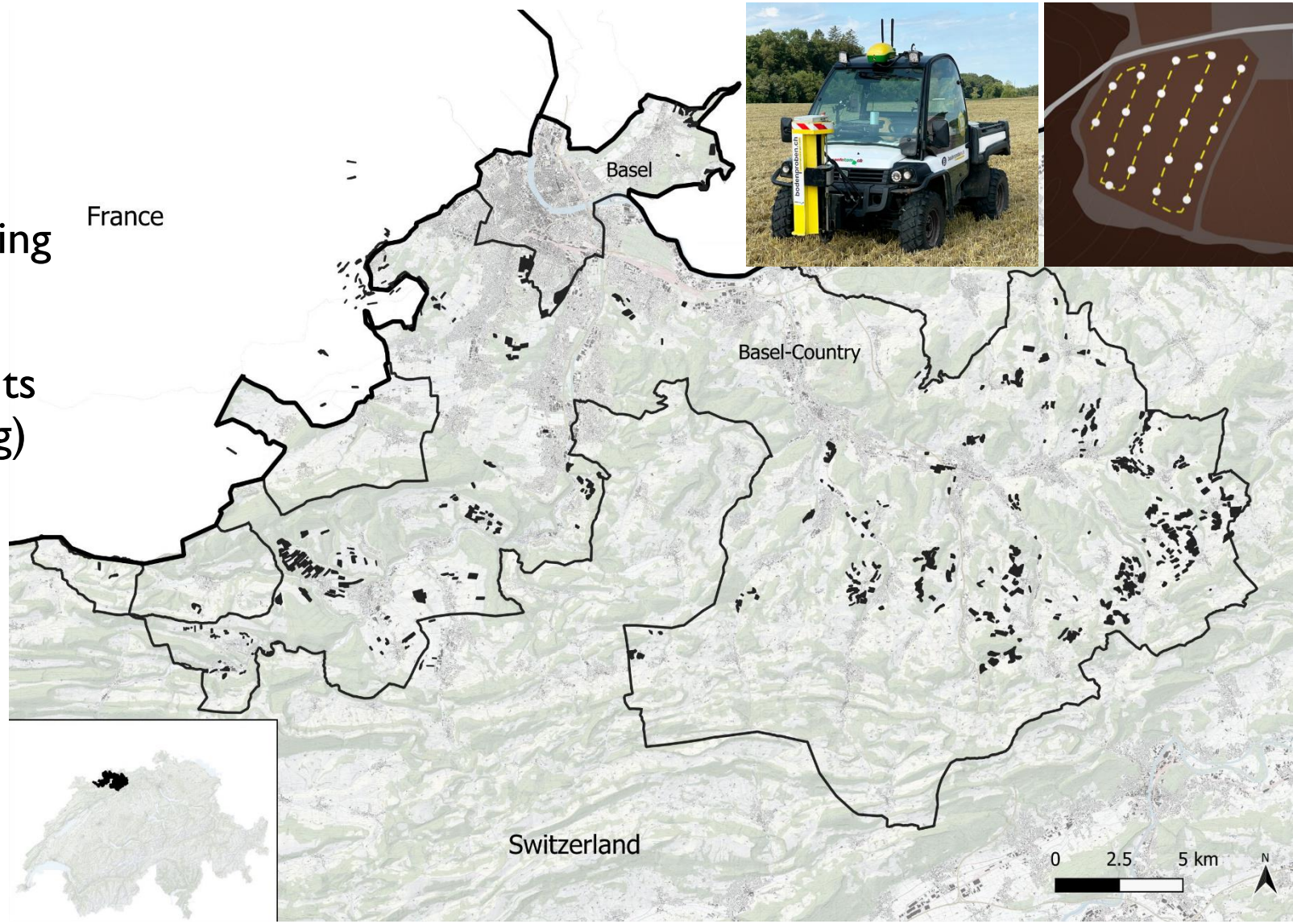
Krause

Carbon credits need a sound scientific monitoring!

- 55 farms, 706 plots, 1100 Ha
- Commercial automated sampling
- Sampling depth: 0-20 cm
- Regular sampling grid (20 points real-time kinematic positioning)
- One mixed sample per plot
- Sampling period: November – March
- Before fertilisation/liming (>3weeks)



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Getting active: Regional compensation project

- CO_2 removal through SOM increase
- SOM increase through improved OM management
- Participation and result-based payment scheme
- Scientific monitoring for knowledge gain

SOM build-up plan
- Half-day meeting with advisor
- Soil assessment
- Field calender
- List of 15 measures

Project start (2020)
- Start sampling
- SOM build-up plan

100 € × Ha^{-1}

3rd year (2023)
- Mid-term sampling
- Interview

100 € × Ha^{-1}
100 € × Mg CO_2^{-1}

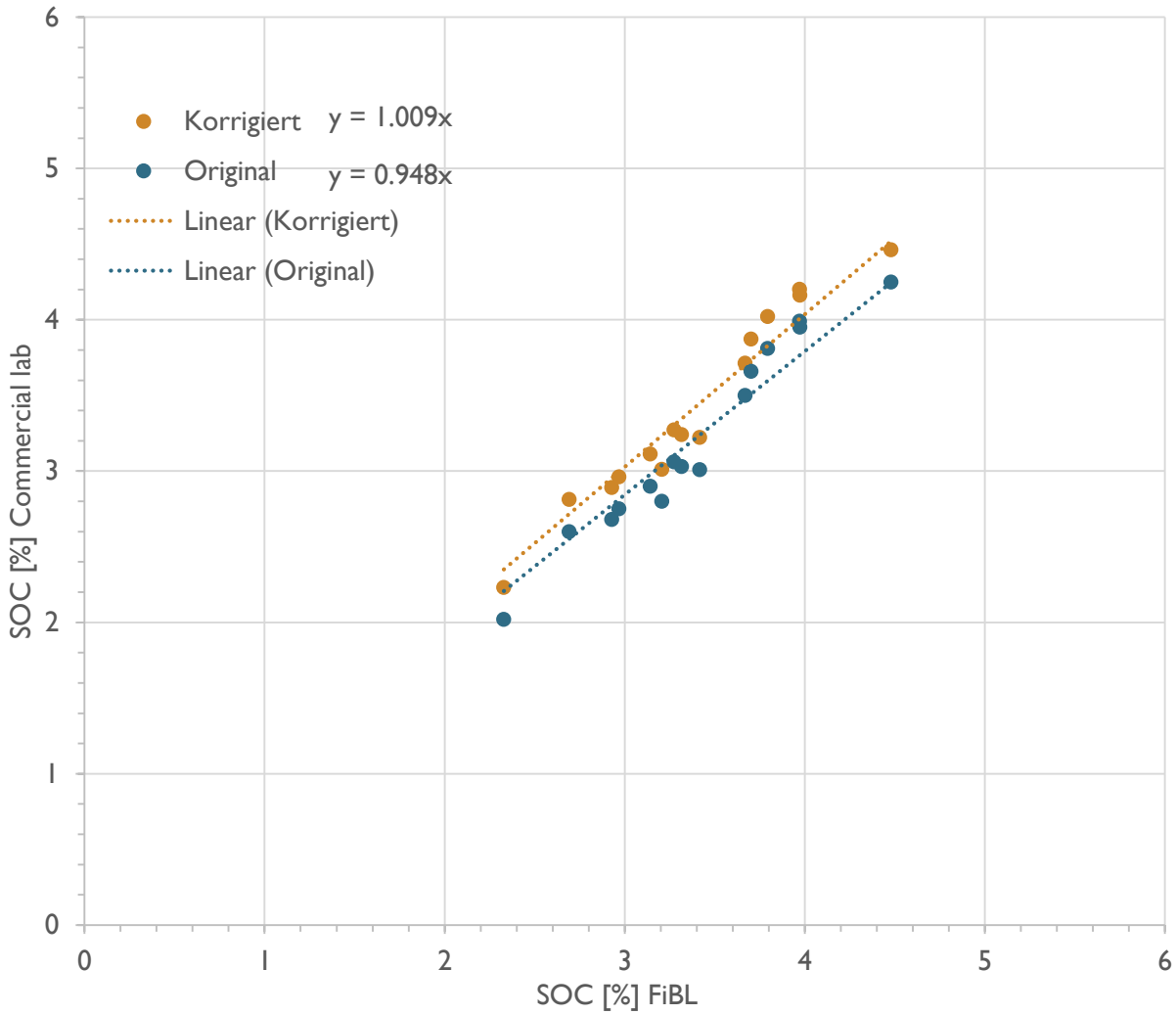
6th year (2026)
- End sampling

100 € × Mg CO_2^{-1}

Measuring soil organic carbon (SOC) concentration: Lab comparison

- Analytical measurement via dry combustion
  cLAB: soli TOC
  FiBL: VarioMax CN
- Each 50th sample in commercial lab and FiBL lab
- Lab comparison across all four sampling years

2021: cLAB + 0.212



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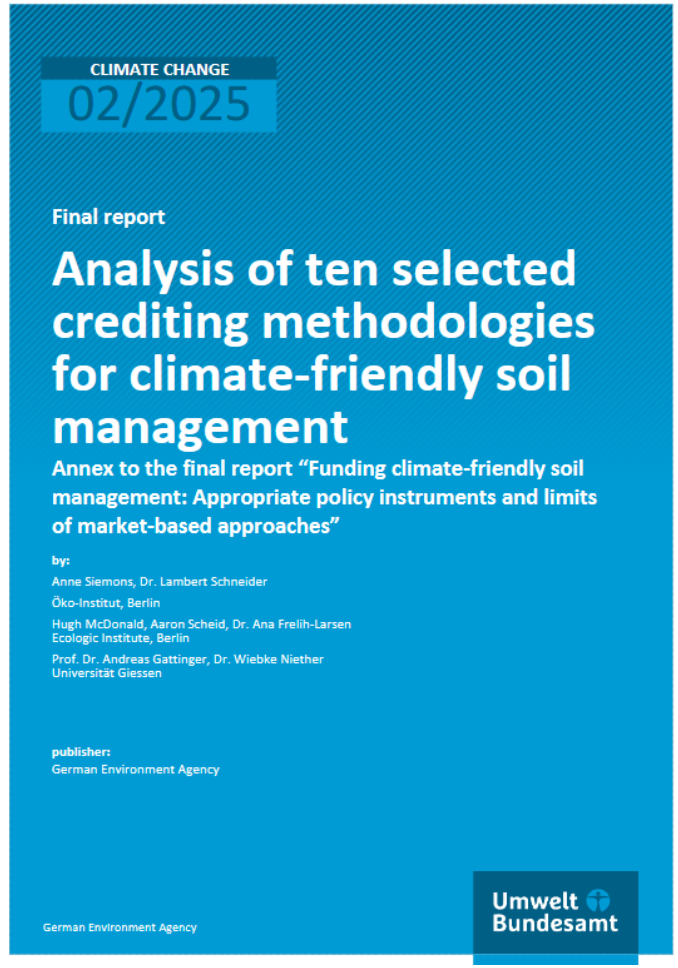
Case study analysis

*We conclude that **action-based funding approaches** are appropriate for many climate-friendly soil management measures, where non-permanence risks are widespread and must be considered.*

***Result-based (non-offset) funding approaches** such as contribution claims and public result-based finance are mostly appropriate for some climate-friendly soil management measures.*

***Offsetting approaches** are not an appropriate instrument for funding climate-friendly soil management measures due to environmental integrity concerns (i.e. they will lead to higher aggregate emissions than without using offsetting) arising from non-permanence, additionality, and quantification uncertainty.*



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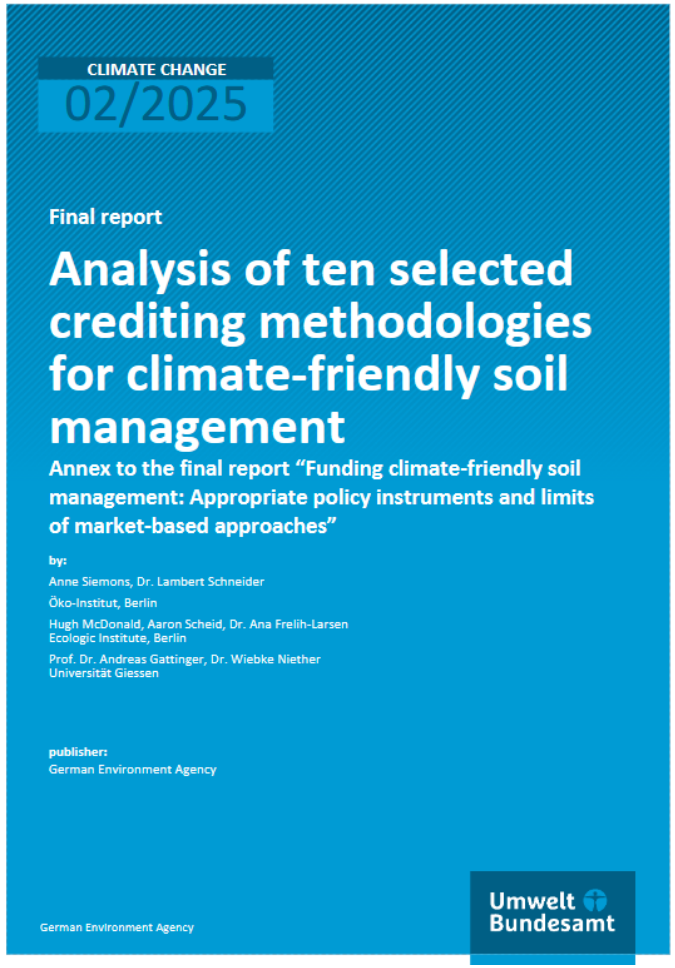
Case study analysis

Our evaluation of crediting methodologies identified many weaknesses with current crediting mechanisms for climate-friendly soil management:

- **Quantification:** Overall, weak monitoring and sampling requirements and inadequate baselines fail to robustly and conservatively quantify mitigation outcomes, endangering the environmental integrity of the carbon credits issued.
- **Additionality:** Overall, the methodologies we assessed are unlikely to ensure that projects and their mitigation are additional, though the likelihood of additionality is higher with some methods than others.
- **Non-permanence:** Overall, the assessed methodologies fail to ensure that mitigation outcomes are sustained for long time periods. Only three of the assessed mechanisms have measures in place to protect mitigation for at least 40 years, and these have other shortcomings. Non-permanence is fundamental for environmental integrity but difficult to achieve for climate-friendly soil management measures, due to the carbon storage of soil being so sensitive to management changes.
- **Double-counting:** Overall, the methodologies show significant weaknesses in terms of avoiding double counting of mitigation outcomes (e.g. among multiple crediting mechanisms, with other funding instruments, or with national climate targets), with insufficient information on credits and their use.
- **Environmental and social safeguards:** Overall, the methodologies are unlikely to ensure environmental and social safeguards and deliver positive sustainable development impacts, though we did identify good examples that could be implemented by all methodologies.
- **Governance:** For the majority of the programmes considered, the available information on the governance of the programmes suggests that institutional arrangements and processes are strong or mostly comprehensive.



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Summary and Recommendations

- Leave **soil carbon credits** on the voluntary market, as they are either (1) scientifically to unsecure to support climate mitigation goals (2) too expensive for farmers and policy to ensure scientific accuracy

If carbon credits would be included in the EU Frameworks, makes sure that they:

- are **biomass carbon credits** (e.g. for agroforestry, shade trees etc.), rather than soil carbon credits
- are **action-based** rather than result-based schemes
- include practice with a **maximum co-benefit** for other sustainability goals
- that organic farms and their baselines are **correctly considers** (4% of all farmland, growing constantly, nearly 500 000 organic producers in EU)
- makes sure to **consider local/geographical and climate trends** of soil carbon sequestration: they may be more important than assumed
- consider **difference between "permanent" and "short-term" carbon** effects

Summary and Recommendations

From the beginning of crediting:

- Make sure to have contracts ready: when to pay, minimum and maximum defined payments, do farmers need to pay back?, who pays for soil sampling?....
- Including farm advisors from the beginning makes sense and can motivate the farmer to implement additional sustainable soil practices.
- Limit (administrative) burden on farmers

Be very clear:

Do we want to compensate CO_2 emissions in agriculture?

Or do we want to finance sustainable farming?

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Thank you for your Attention!

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