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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:



In partnership with:



An Roinn Talmhaíochta,  
Bia agus Mara  
Department of Agriculture,  
Food and the Marine



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**Science:**  
Critical insights into  
Carbon Farming

**FiBL**

[www.fibl.org](http://www.fibl.org)



Lin Bautze,  
FiBL Schweiz

**Market:**  
Market-Based  
Solutions and Farmer  
Challenges



[regeneration.eu](http://regeneration.eu)



Paul Martin,  
ReGeneration

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



**PRODUTTORI AOR**  
[produttoriaor.org](http://produttoriaor.org)



Chiara Michelone,  
Produttori AOR

**Policy:**  
Implementing  
carbon farming into  
policy

**IFOAM**  
ORGANICS EUROPE

[www.organicseurope.bio](http://www.organicseurope.bio)



Hanna Winkler,  
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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

**THE FOUR PRINCIPLES OF ORGANIC AGRICULTURE**


**HEALTH**

Healthy soils produce healthy crops that foster the health of animals and people. Organic agriculture is intended to produce high quality, nutritious food that contributes to preventive health care and well-being.




**ECOLOGY**

All land is home to wildlife and important for ecosystem services. Organic agriculture aims for ecological balance through the design of farming systems, establishment and good maintenance of habitats and conservation of agricultural biodiversity and genetic resources.




**FAIRNESS**

Equity, respect, justice and stewardship of the shared world. Organic agriculture aims to provide good food for all and a decent living for farmers and food workers.



**CARE**

Taking care of each other and our surroundings. Organic agriculture focuses on how we can enhance efficiency and increase productivity without jeopardizing the health and well-being of people and the planet.




**How can organic agriculture help us address challenges?**

**SOIL**

Organic agriculture is centered on boosting soil health. What are the benefits of healthy soil?

*What are some of the benefits of healthy soil?*

-We can grow nourishing, nutrient-dense foods in it without using inputs like artificial fertilizers  
-It provides us with higher crop yields in the long term




**BIODIVERSITY**

Organic agriculture seeks to maintain and boost biodiversity. Why does that matter?

*What are some of the reasons biodiversity matters?*

-Seed and crop diversity makes farms and landscapes more resilient to challenges (such as pest incursions) and change (such as global warming)  
-Monoculture impacts negatively on soil health and biodiversity




**LIVELIHOODS**

How can organic agriculture help create more sustainable, secure and resilient livelihoods?

*What are some of the key questions when considering sustainable livelihoods?*

-What is the difference between food security and food sovereignty?  
-How can organic agriculture contribute to more secure and resilient food production?





**CLIMATE CHANGE**




How can organic agriculture contribute to addressing the climate crisis?

*Some contributions include:*

-Soil that's cultivated organically stores more carbon than that which is cultivated for conventional agriculture  
-It reduces greenhouse gas emissions by omitting the use of pesticides




 Global Landscapes Forum  
[globallandscapesforum.org](http://globallandscapesforum.org)

Funding partners:  

 Federal Ministry for the Environment, Nature Conservation and Nuclear Safety  

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 IFOAM ORGANICS

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

# 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)





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 <sup>a</sup>,  , Bartosz Bartkowski <sup>b</sup>, Cenk Dönmez <sup>a, i</sup>, Axel Don <sup>c</sup>, Stefanie Mayer <sup>d</sup>, Markus Steffens <sup>e</sup>, Sebastian Weigl <sup>a</sup>, Martin Wiesmeier <sup>d, f</sup>, André Wolf <sup>g</sup>, Katharina Helming <sup>a, h</sup>


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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.

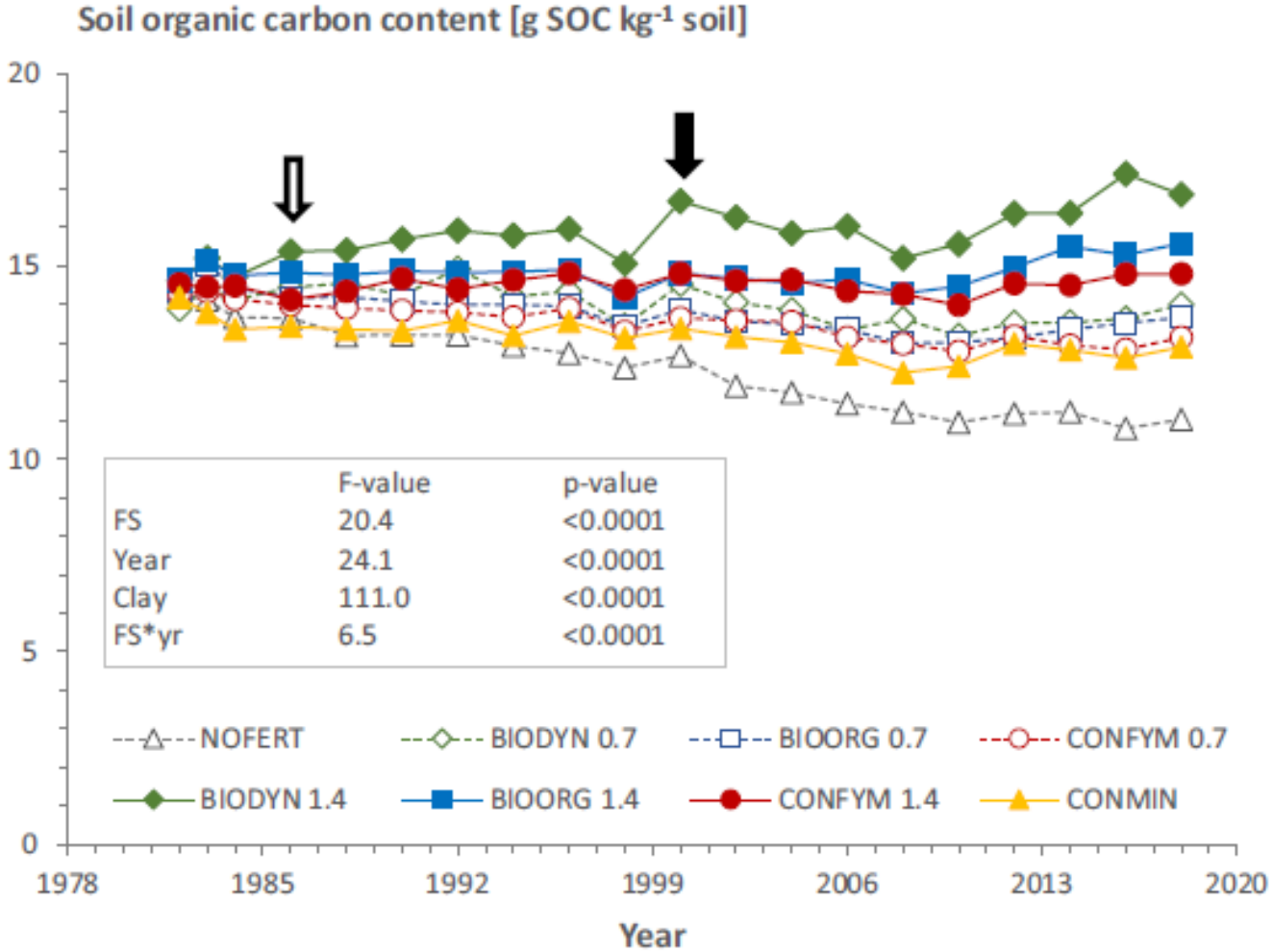
# Relevance of Carbon Farming for Organic Agriculture

- **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



Dossier

2024 | No. 1741

The DOK Trial

A 45-year comparative study of organic and conventional cropping systems



FiBL



# DOK-trial: Synthesis climate effect of organic agriculture

Dossier

2024 | No. 1741

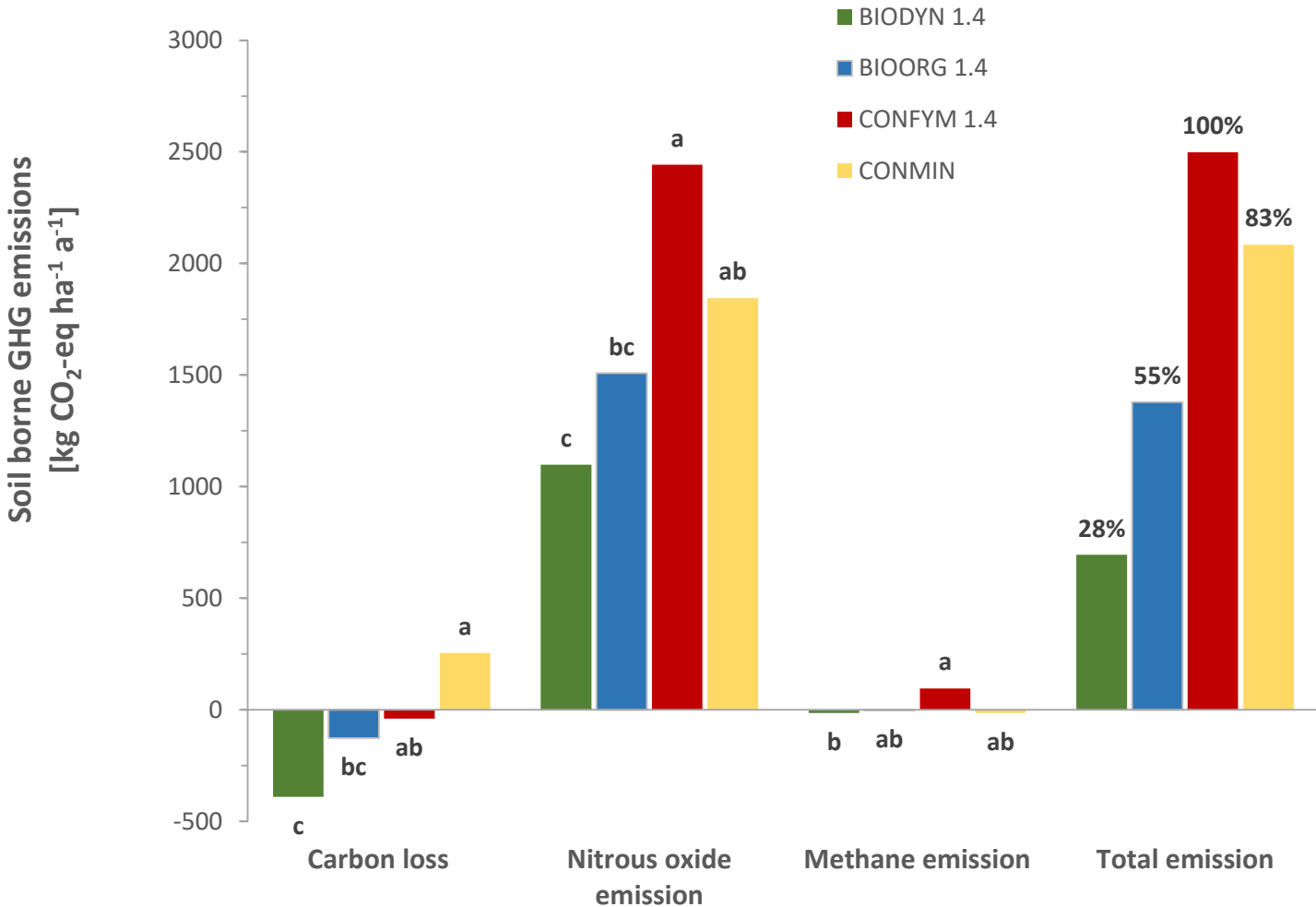
The DOK Trial

A 45-year comparative study of organic and conventional cropping systems



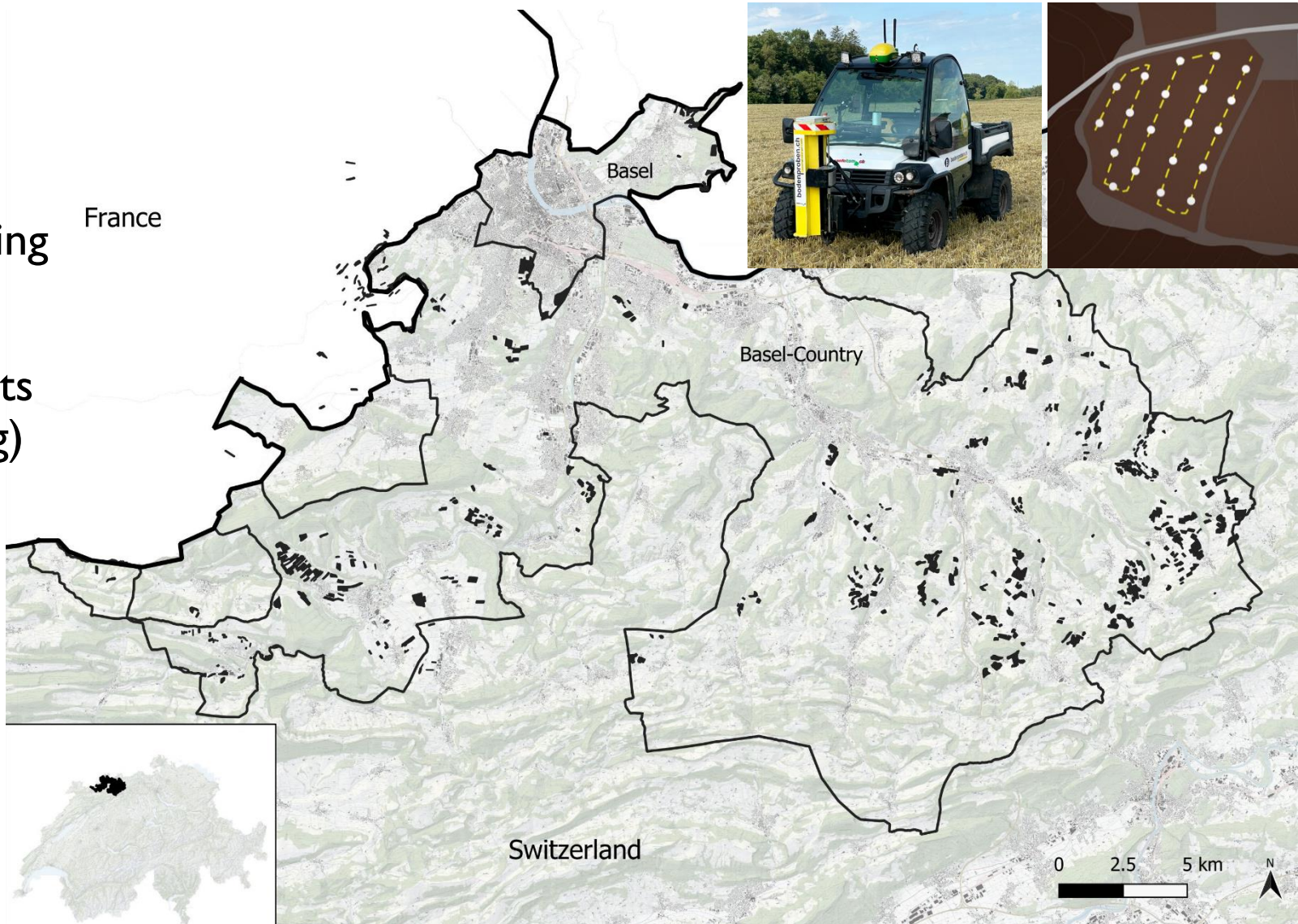
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<https://www.fibl.org/de/shop/1741-dok-dossier-en>



# 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)



# Getting active: Regional compensation project

- CO<sub>2</sub> removal through SOM increase
- SOM increase through improved OM management
- Participation and result-based payment scheme
- Scientific monitoring for knowledge gain

## Project start (2020)

- Start sampling
- SOM build-up plan

100 € × Ha<sup>-1</sup>

## 3<sup>rd</sup> year (2023)

- Mid-term sampling
- Interview

100 € × Ha<sup>-1</sup>

100 € × Mg CO<sub>2</sub><sup>-1</sup>

## SOM build-up plan

- Half-day meeting with advisor
- Soil assessment
- Field calendar
- List of 15 measures

## 6<sup>th</sup> year (2026)

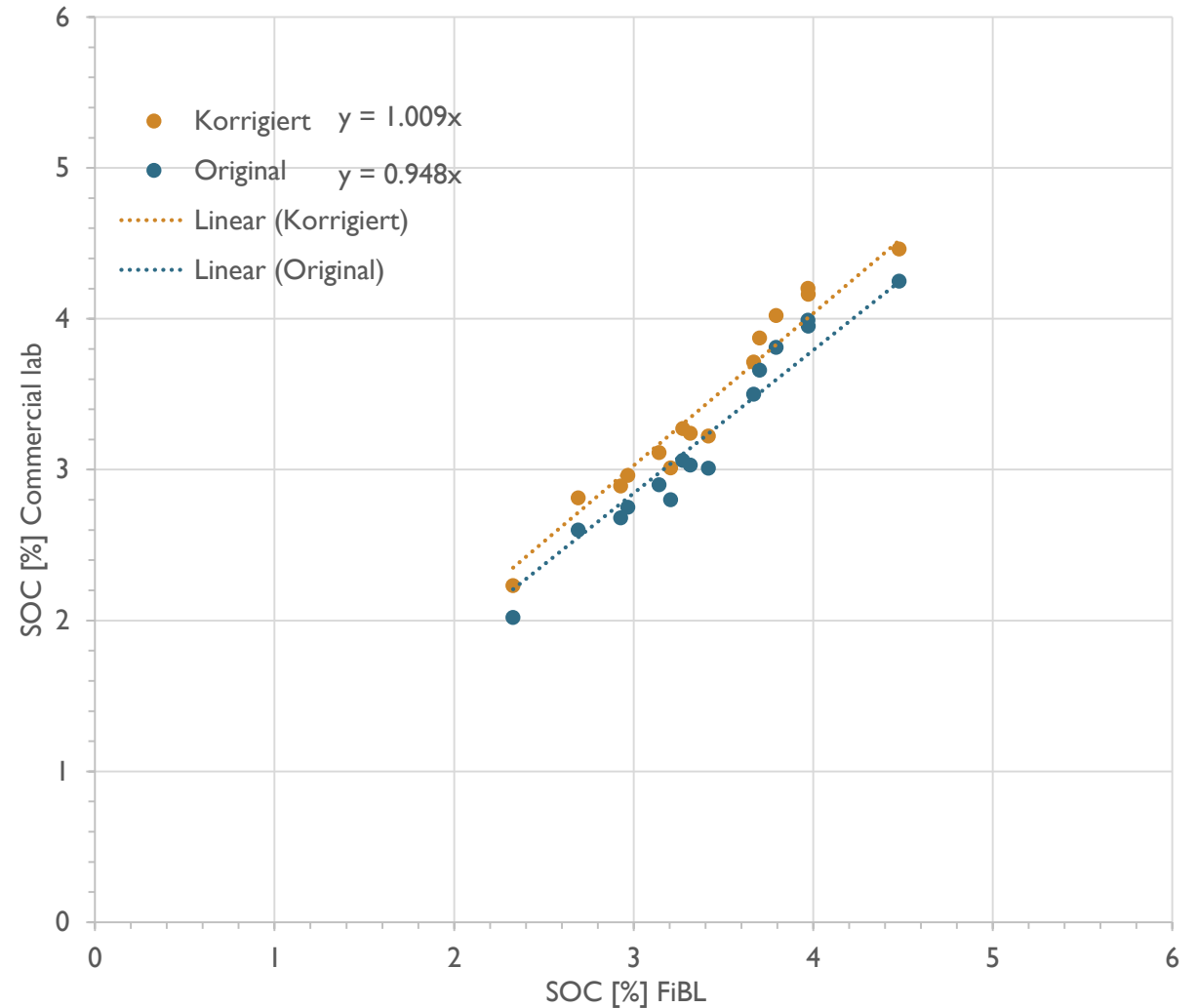
- End sampling

100 € × Mg CO<sub>2</sub><sup>-1</sup>

# Measuring soil organic carbon (SOC) concentration: Lab comparison

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

2021: cLAB + 0.212



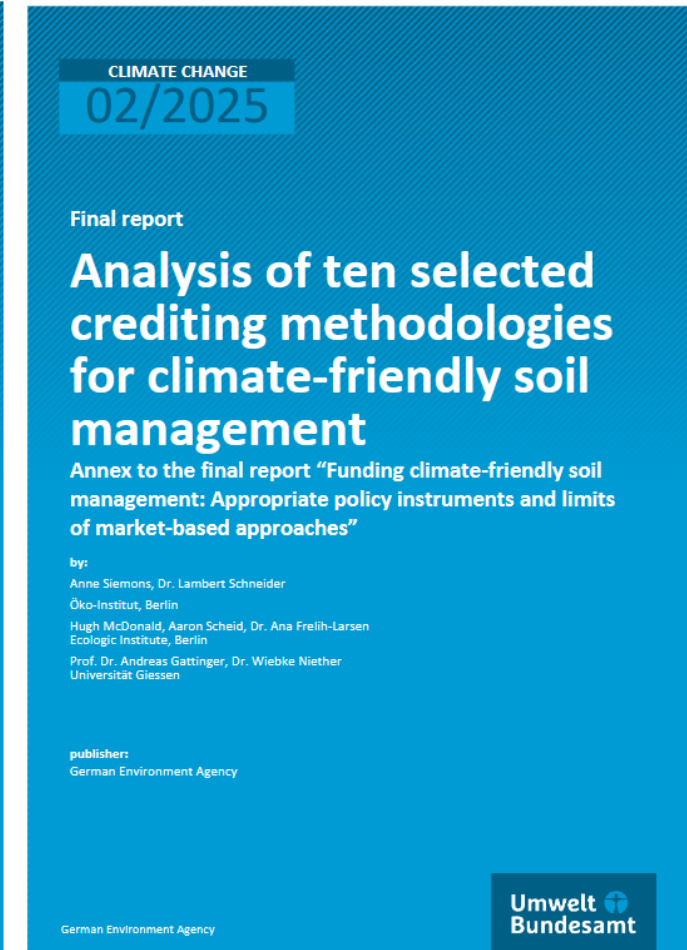


# Case study analysis

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.

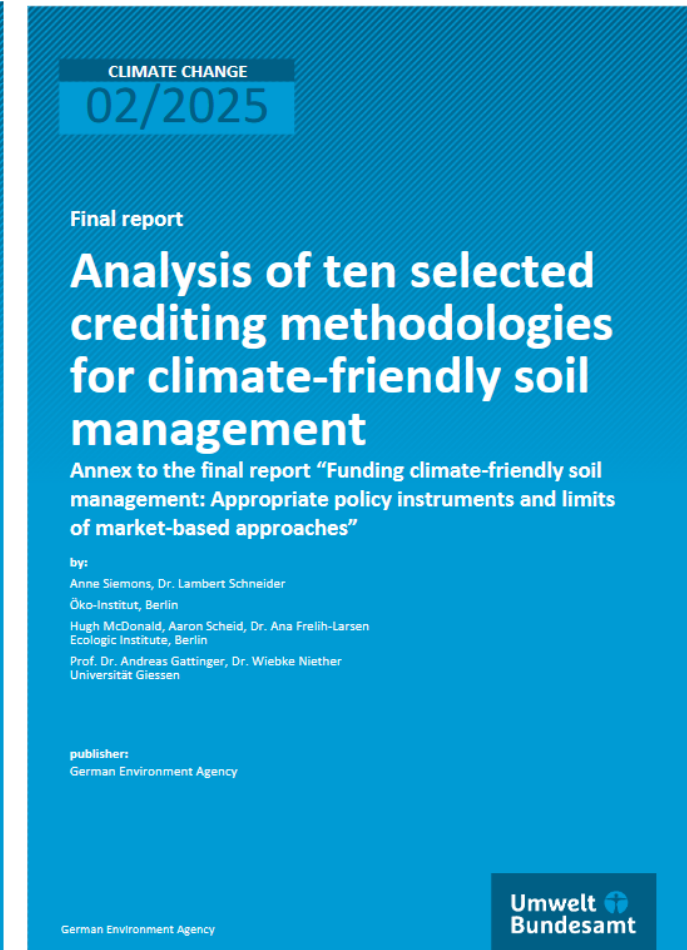
**Offsetting approaches** are not an appropriate instrument for funding climate-friendly soil management measures due to environmental integrity concerns (i.e. they will lead to higher aggregate emissions than without using offsetting) arising from non-permanence, additionality, and quantification uncertainty.



# 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.



# Summary and Recommendations

- Leave **soil carbon credits** on the voluntary market, as they are either (1) scientifically too 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, make 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 considered** (4% of all farmland, growing constantly, nearly 500 000 organic producers in EU)
- make 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<sub>2</sub> emissions in agriculture?**

**Or do we want to finance sustainable farming?**



# Thank you for your Attention!

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