Carbon farming –

New potential for farmers or greenwashing?

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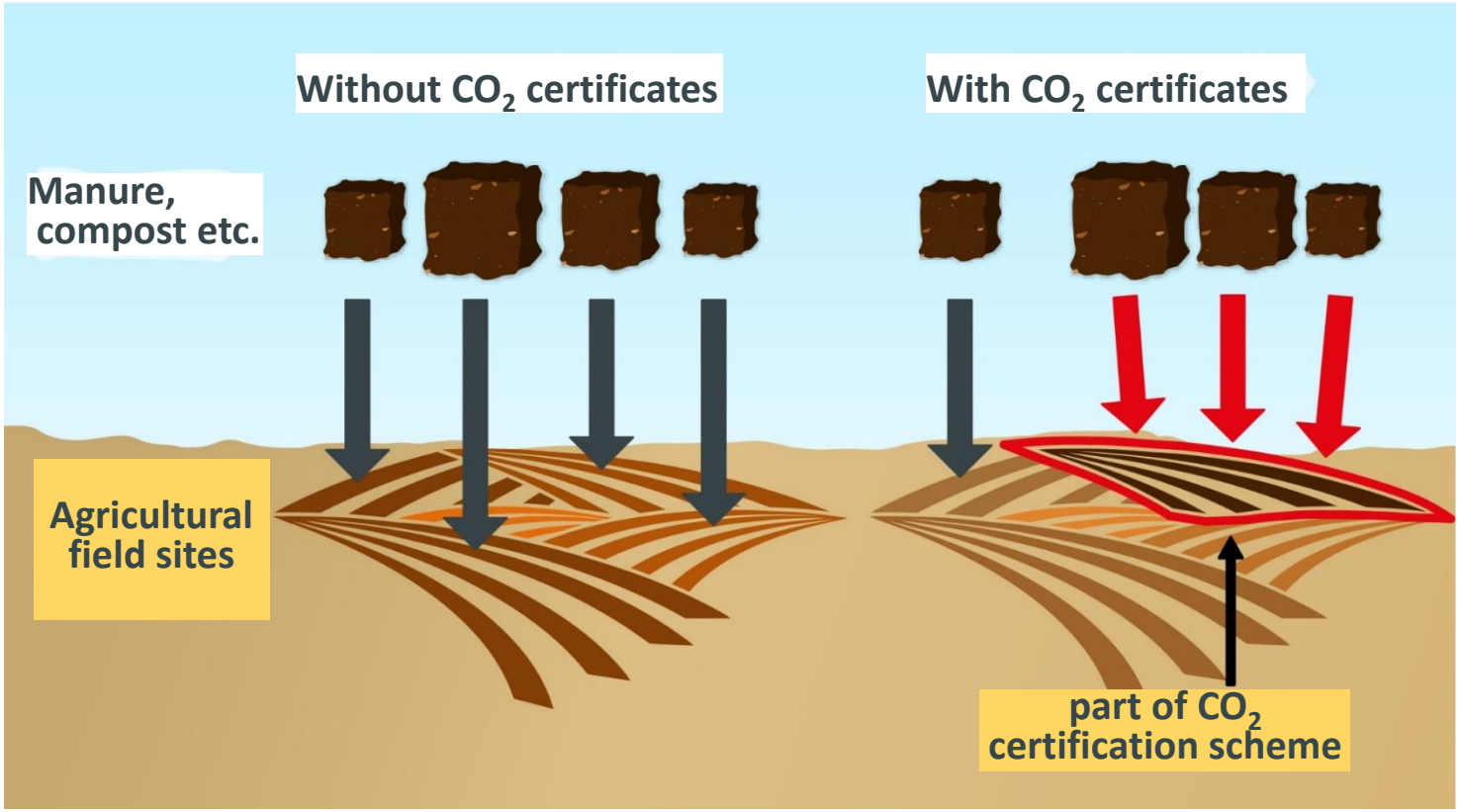
07.02.2023

Conference carbon farming

Leakage with organic fertilisation



- **Transfer of C with manure** but no enhanced soil C stock at large scale
- Leakage instead of climate mitigation

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Potential CO_2 Sequestration in agricultural soils

Agroforestry
(0,05 - 0,20 Mio. ha)
0,1 - 0,5 Mio. t CO_2/a

New hedges
(0,02 - 0,03 Mio. ha)
0,2 - 0,5 Mio. t CO_2/a

Cropland to grassland
(0,1 - 0,2 Mio. ha)
0,2 - 0,5 Mio. t CO_2/a

30% area organic farming
(0,9 - 1,9 Mio. ha)
0,9 - 1,9 Mio. t CO_2/a

Cover crops/ Undersawn crops
(1,1 - 1,8 Mio. ha)
1,3 - 2,1 Mio. t CO_2/a

Improved crop rotations
(0,7 - 1,4 Mio. ha)
0,4 - 0,8 Mio. t CO_2/a

Don 2022, DLG Mitteilungen

- With high ambitions: 3 to 6 Mio. t CO_2 could be compensated via built-up of soil carbon in German agriculture

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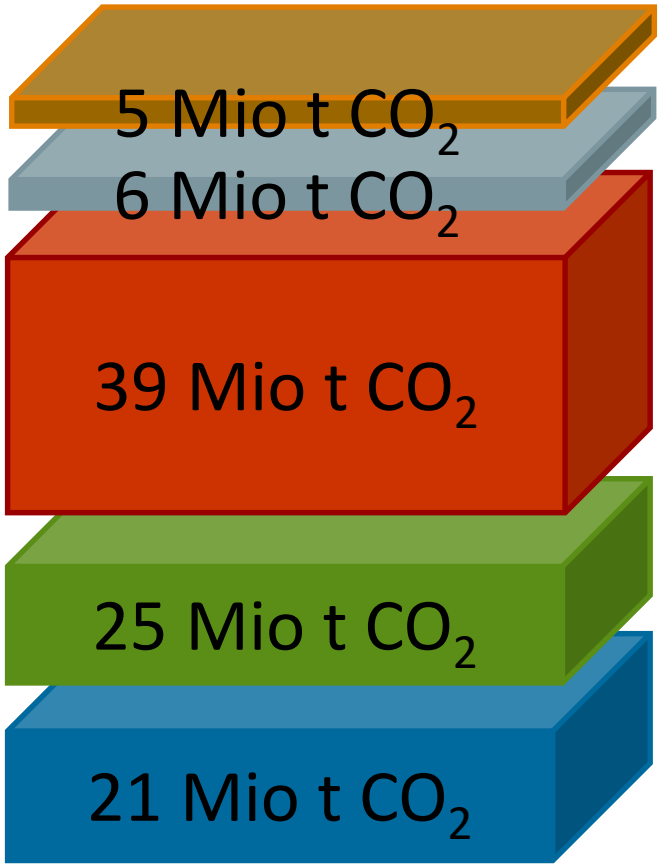
Greenhous gas emissions agriculture Germany



Fertiliser production (CO_2)

Energy/fuels (CO_2)

Peatland drainage (CO_2)

Ruminants (CH_4)

Fertilisation (N_2O, CH_4)

- Sum: 106 Mio t CO_{2eq} = 14% of the total German GHG emissions in 2021

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Source: Thünen Institute of Climate Smart Agriculture, National inventory report 2022

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At European scale: EJP Soil

EU-cofunded program with 24 partner countries:

We estimate the **feasible CO_2 sequestration** potential in European agricultural soils and biomass

First results indicate that not more than 10% of agricultural GHG could be compensated with built-up of soil C.

For further information see: www.ejpsoil.eu

EJP SOIL
European Joint Programme

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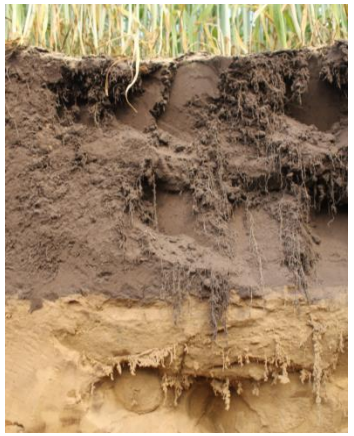
Definition of carbon farming

Carbon farming refers to the **management of carbon pools, flows and GHG fluxes at farm level**, with the purpose of mitigating climate change.



This involves the management of both **land and livestock**, all pools of carbon in soils, materials and vegetation, plus fluxes of carbon dioxide (**CO_2**) and methane (**CH_4**), as well as nitrous oxide (**N_2O**).

COWI, Ecologic Institute and IEEP (2021) Technical Guidance Handbook

- **All GHG-fluxes** need to be taken into account and tackled.
- **$CO_{2\text{-equiv}}$ per product** is indicator for climate-friendlyness and should be awarded

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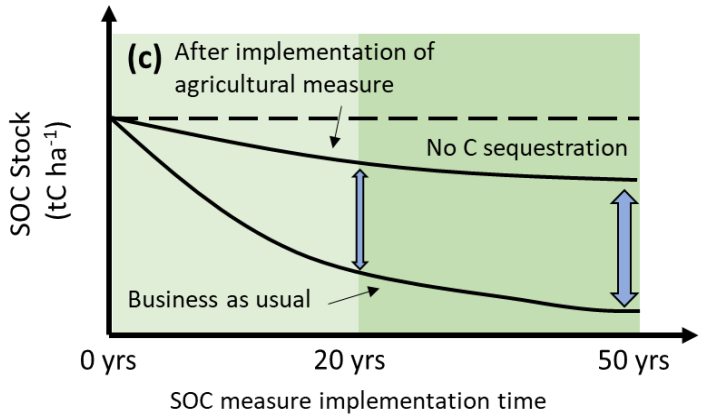
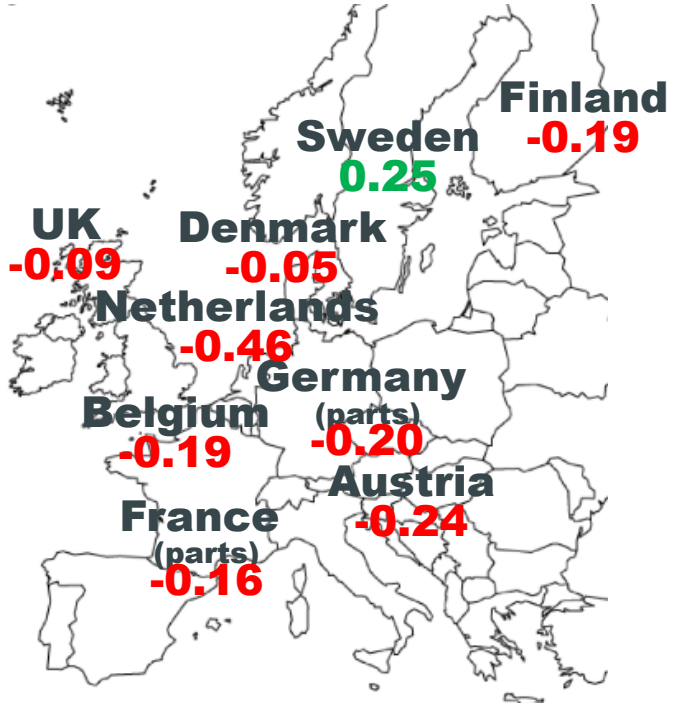
Negative emissions???

- Many croplands in Europe loose C
- Agricultural measures to enhance soil C first need to stop C losses
- Negative emissions and C sequestration may thus be hardly achivable for many soils



Recent soil carbon stock changes in croplands



In t C/ha/yr and based on repeated soil inventories

Sources: Heikkinen et al. 2013, Poeplau et al. 2015, Taghizadeh-Toosi et al. 2014, Lettens et al. 2005, Knotters et al. 2022, Dersch and Böhm 1997, Höper 2021, Antoni et al., 2008

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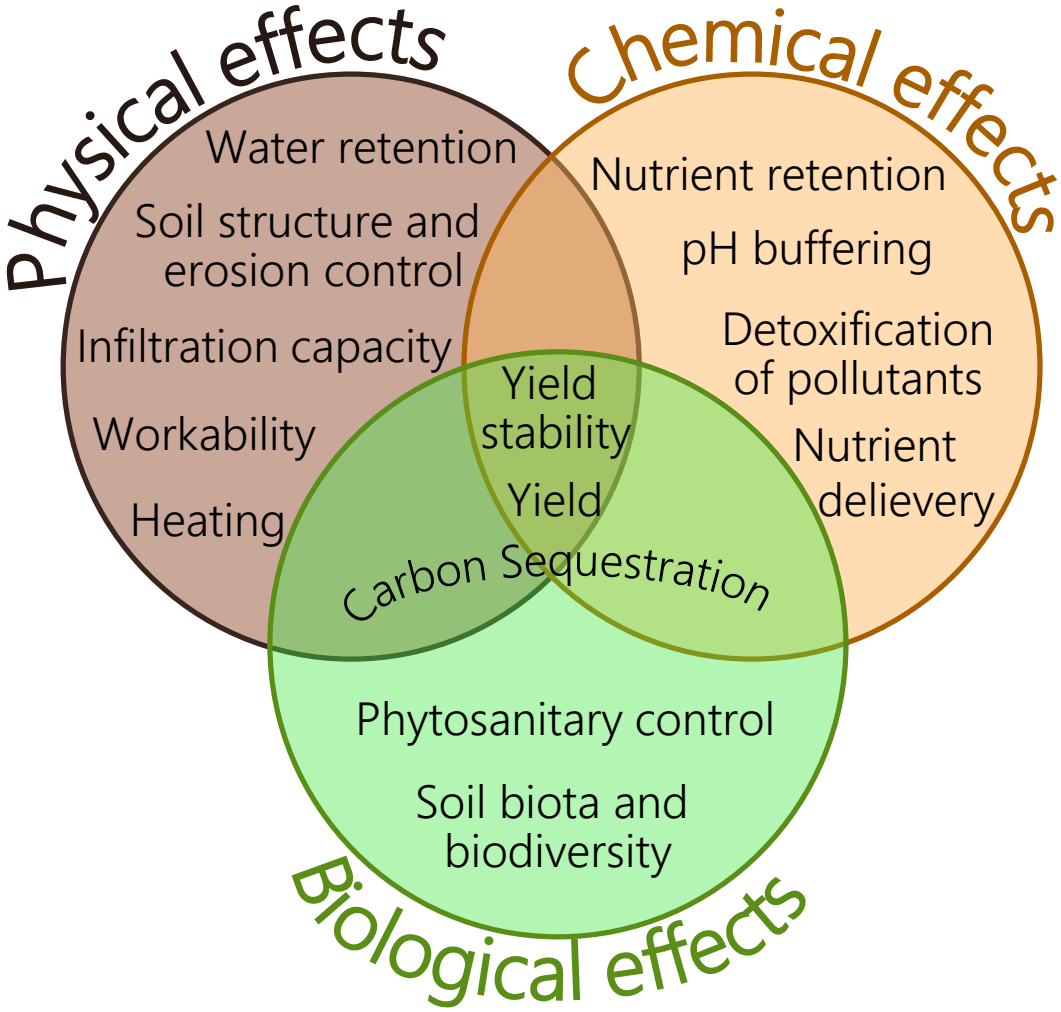
Soil organic matter – More than for C sequestration!



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3 take home messages

- Most existing private CO_2 certificates for soil carbon are prone to leakage
- Only a small fraction of GHGs can be compensated – focus should be on emission reduction
- Many croplands in Europe loose carbon. Before becomming CO_2 sinks, this loss need to be stopped.

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