

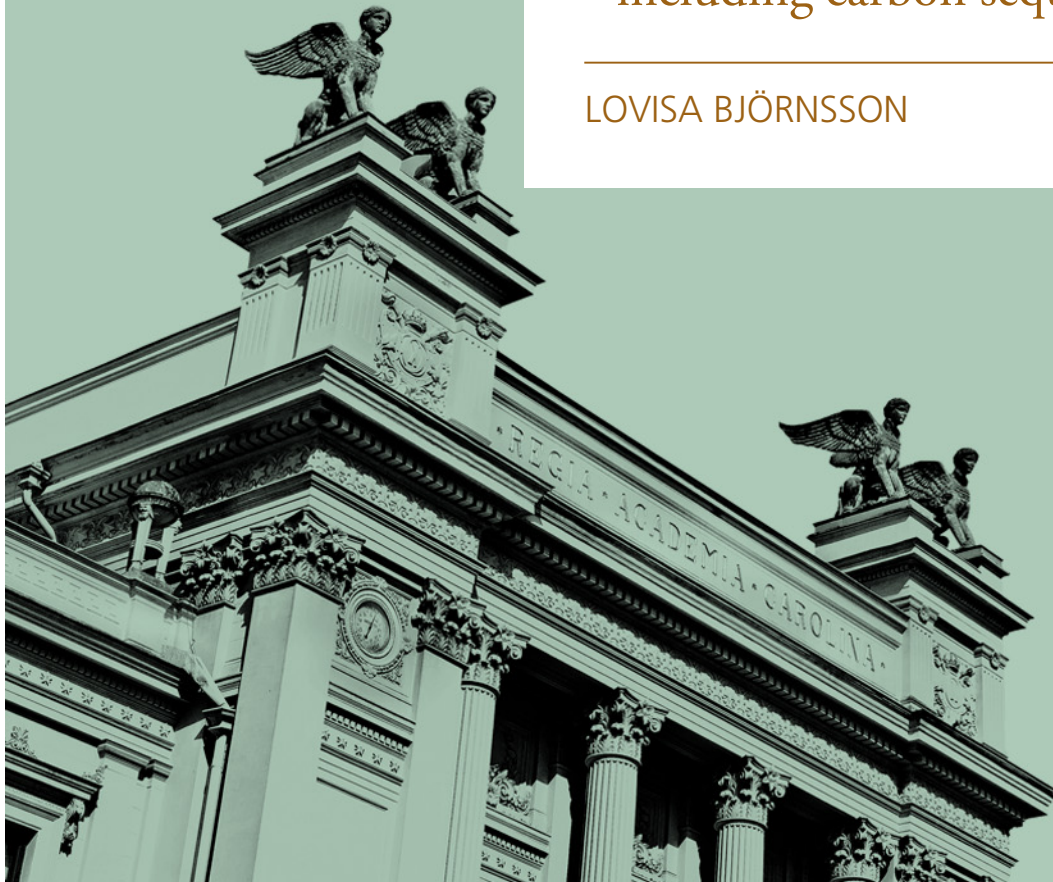


LUNDS
UNIVERSITET

Arable land as carbon sink

- including carbon sequestration in biogas systems studies

LOVISA BJÖRNSSON



Soil organic carbon

750 billion t C

550 billion t C

1 500 billion t C

“45% of the soils in the EU have low or very low (0-2%), and declining, soil organic carbon (SOC) content”

”...soil resources in many parts of Europe are being over-exploited, degraded and irreversibly lost due to inappropriate land management practices...”

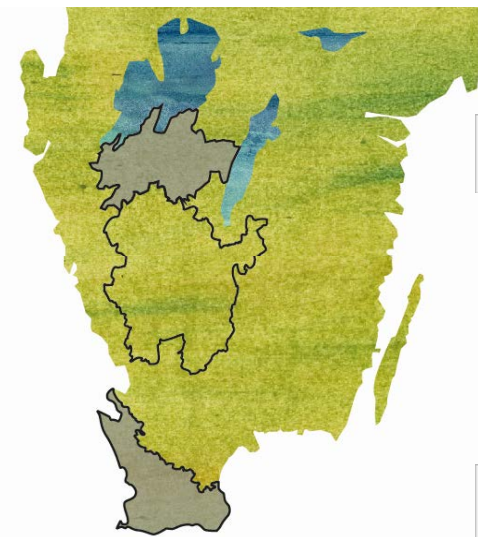
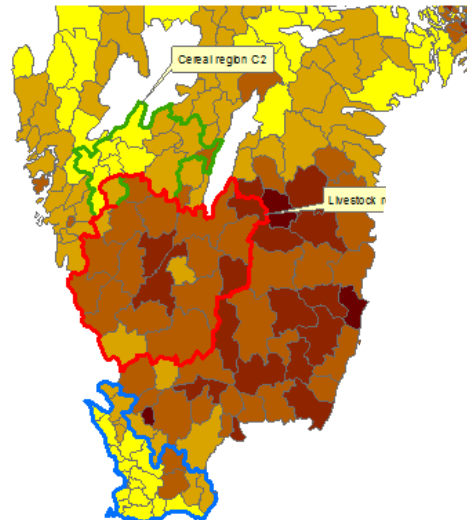
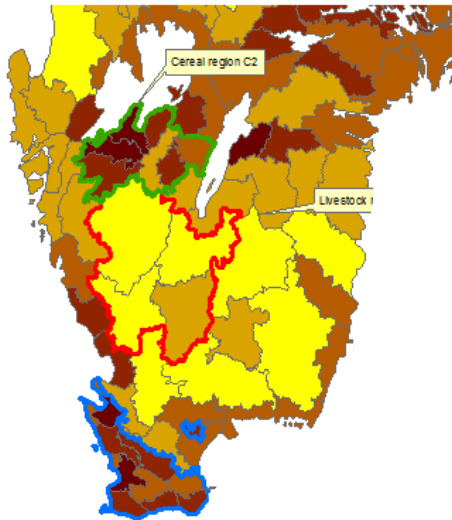
”A healthy, fertile soil is at the heart of food security”

Kätterer & Andrén (1998)
Long-term agricultural field experiments in Northern Europe: Analysis of the influence of management on soil carbon stocks using the ICBM model. *Agriculture, Ecosystems and Environment*. 72, 165-179.

Jones et al. (2012) The state of soil in Europe. Report EUR 25186 EN. JRC, Ispra, Italy.

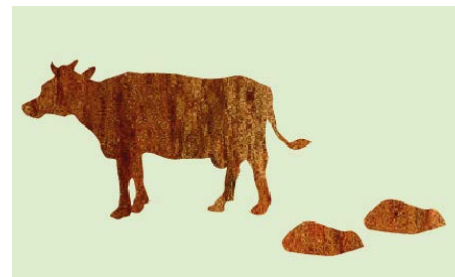


Specializing agriculture

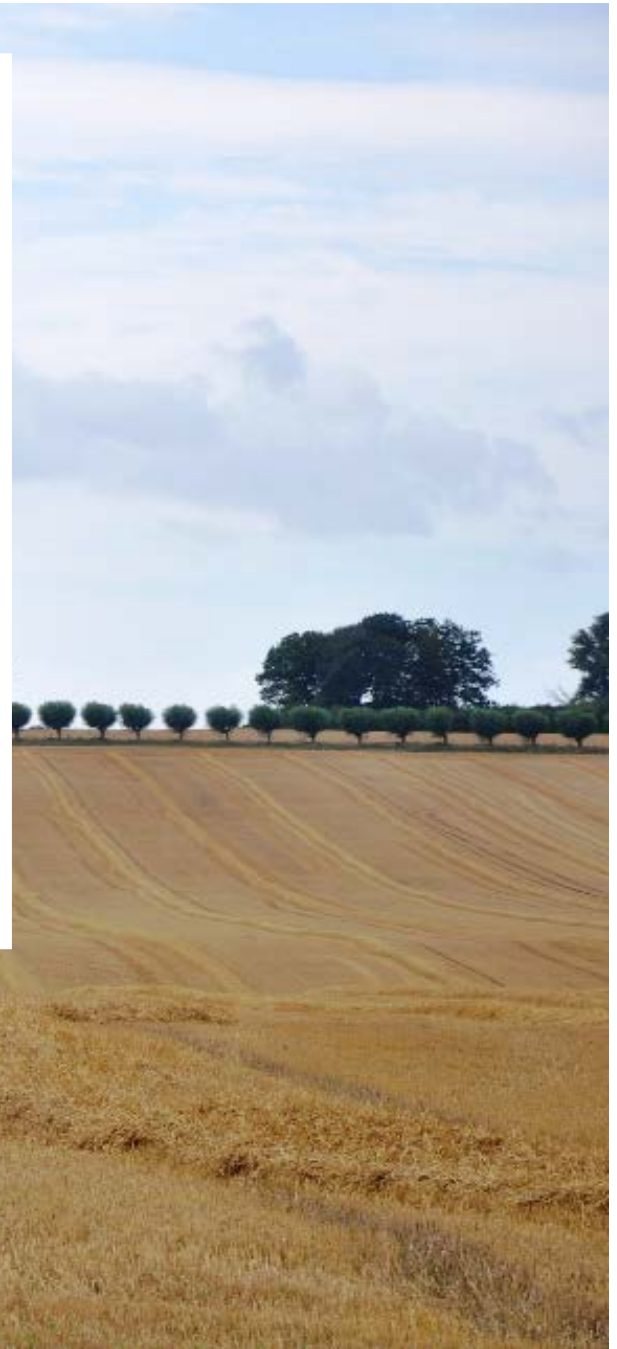


C2

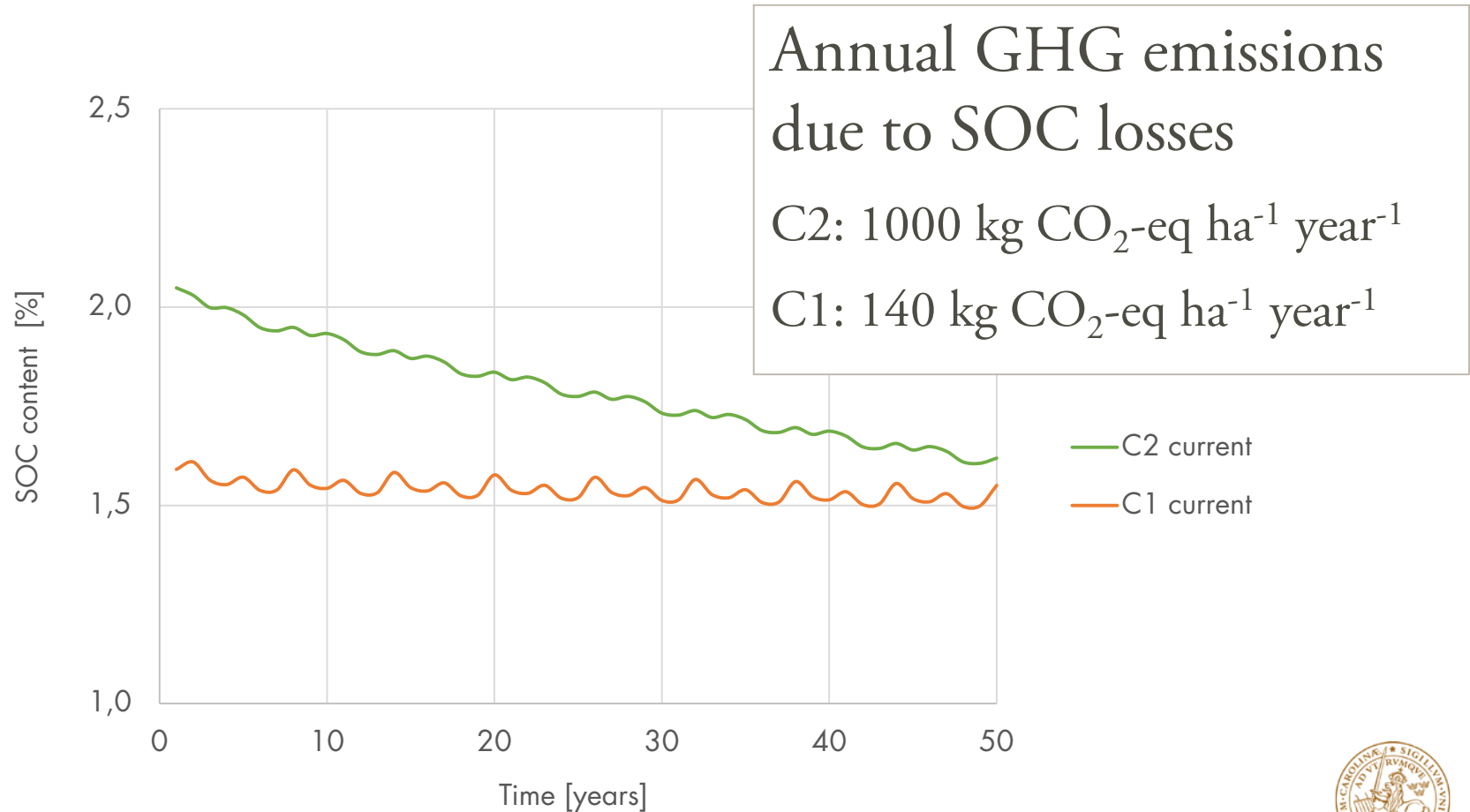
C1







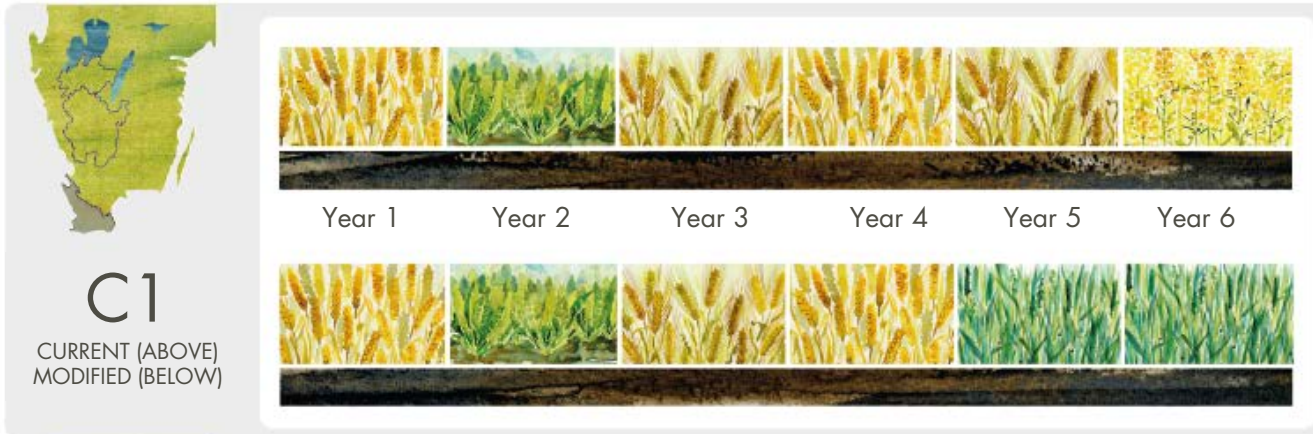
Current SOC development



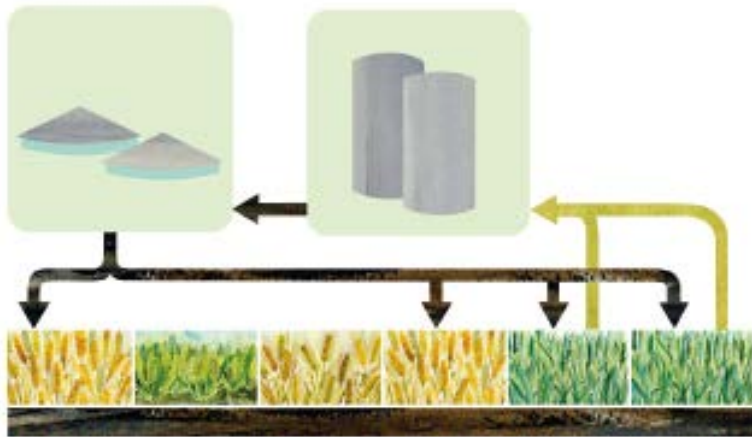




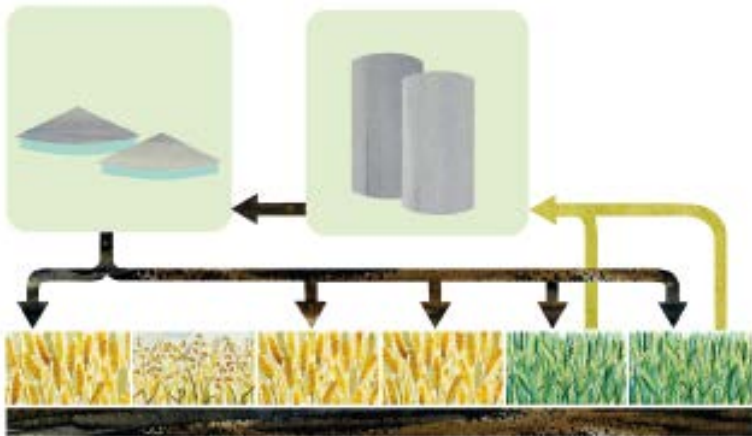
The studied crop rotations



Grass as biogas feedstock



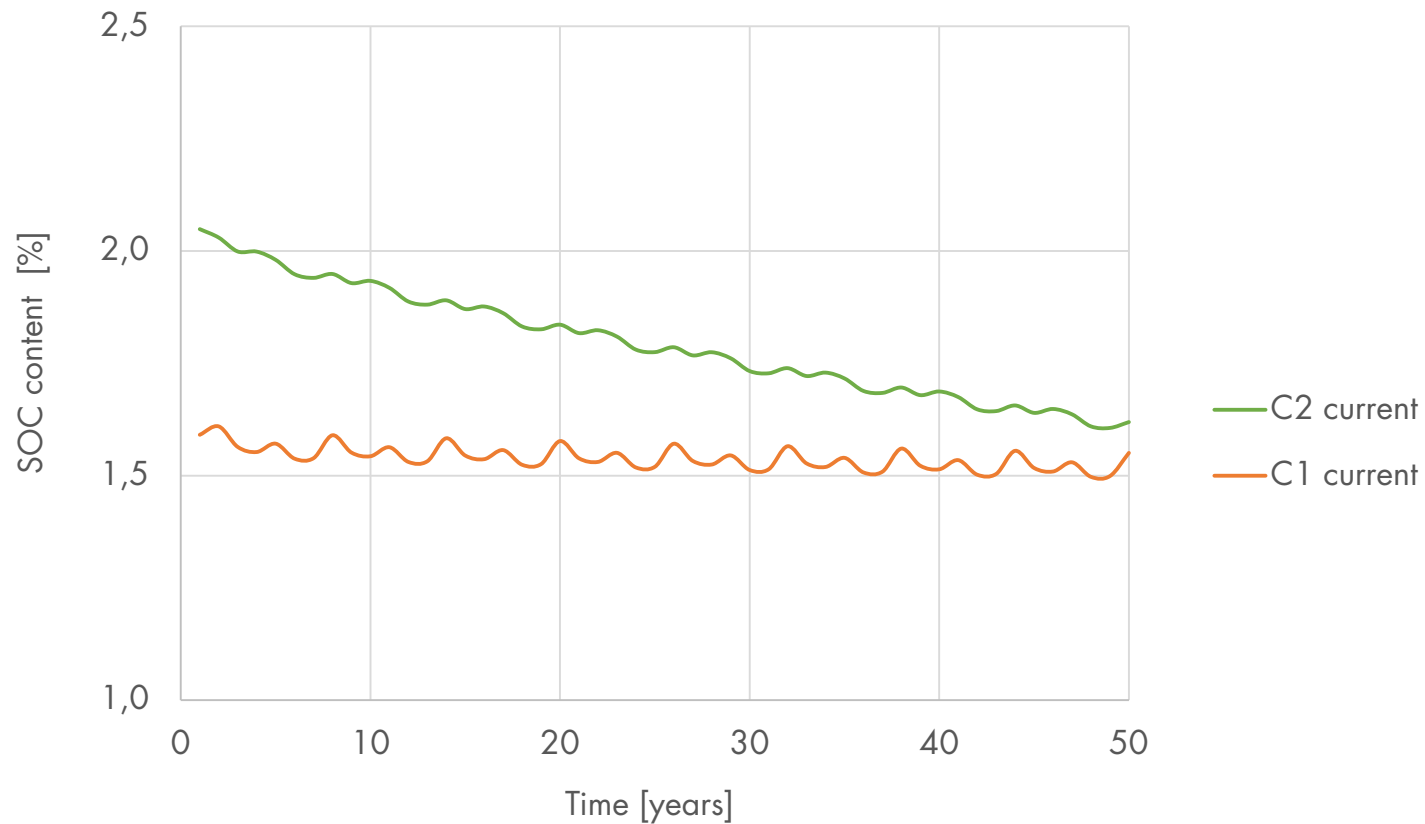
C1



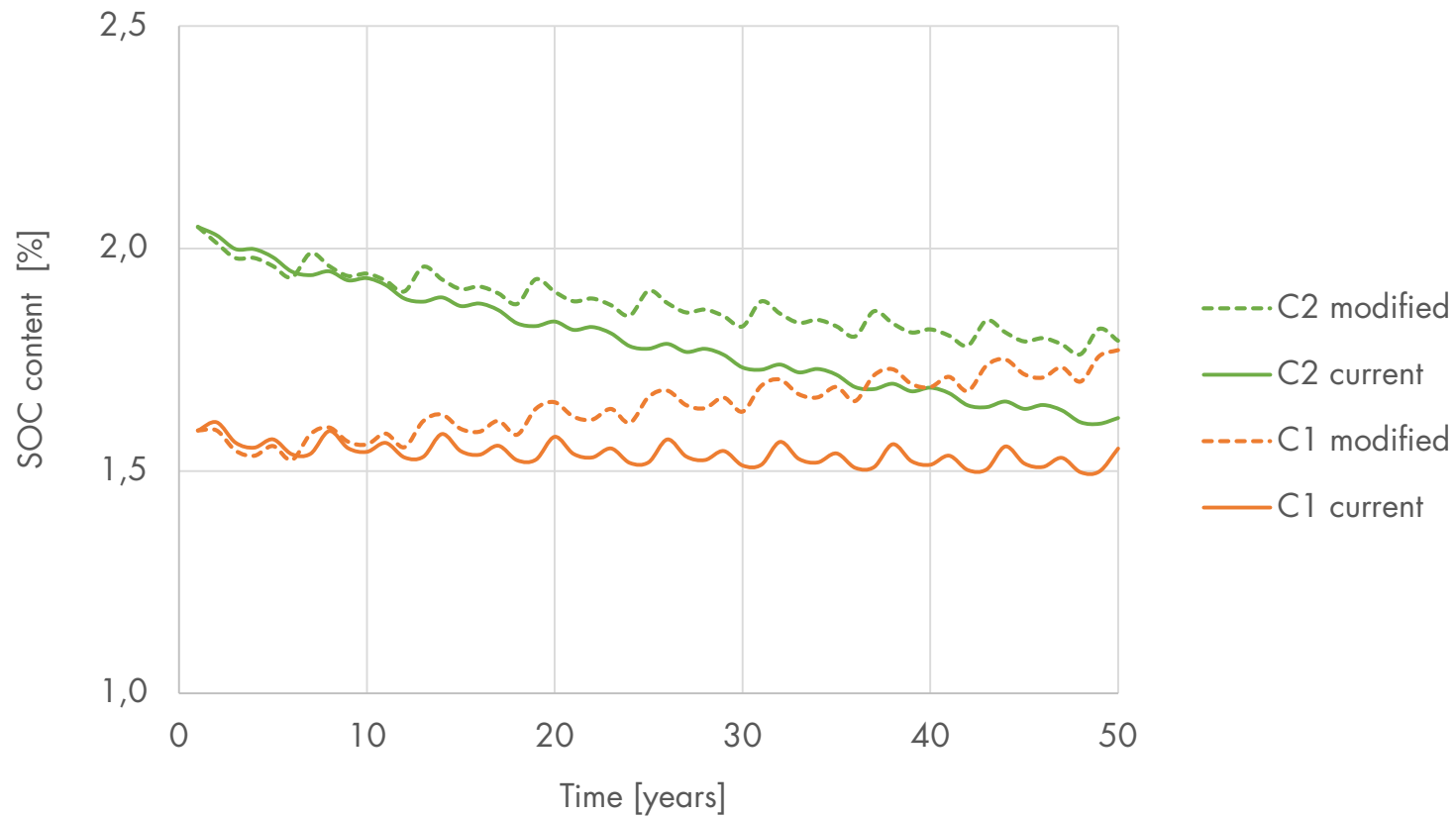
C2



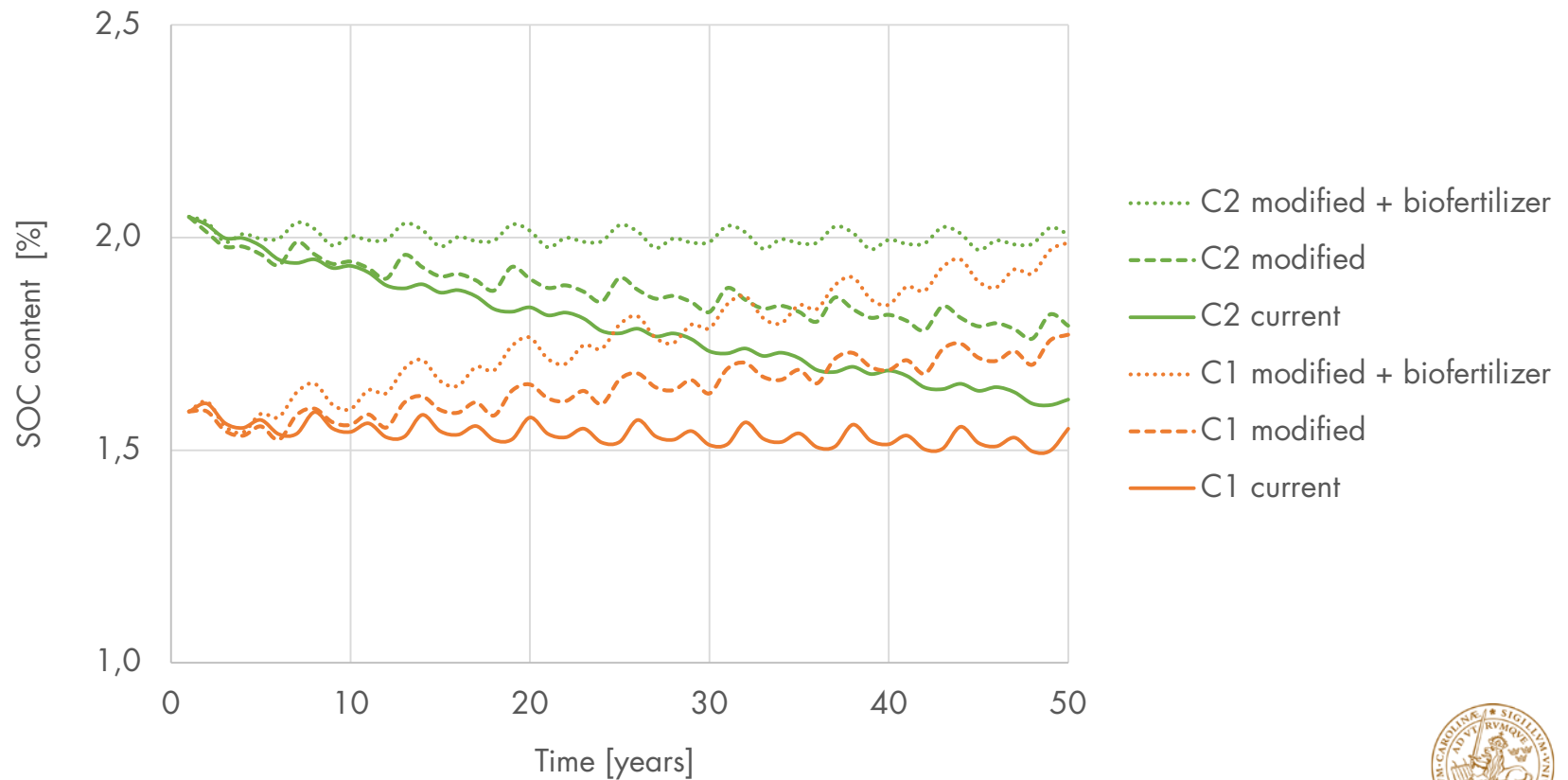
Soil carbon development



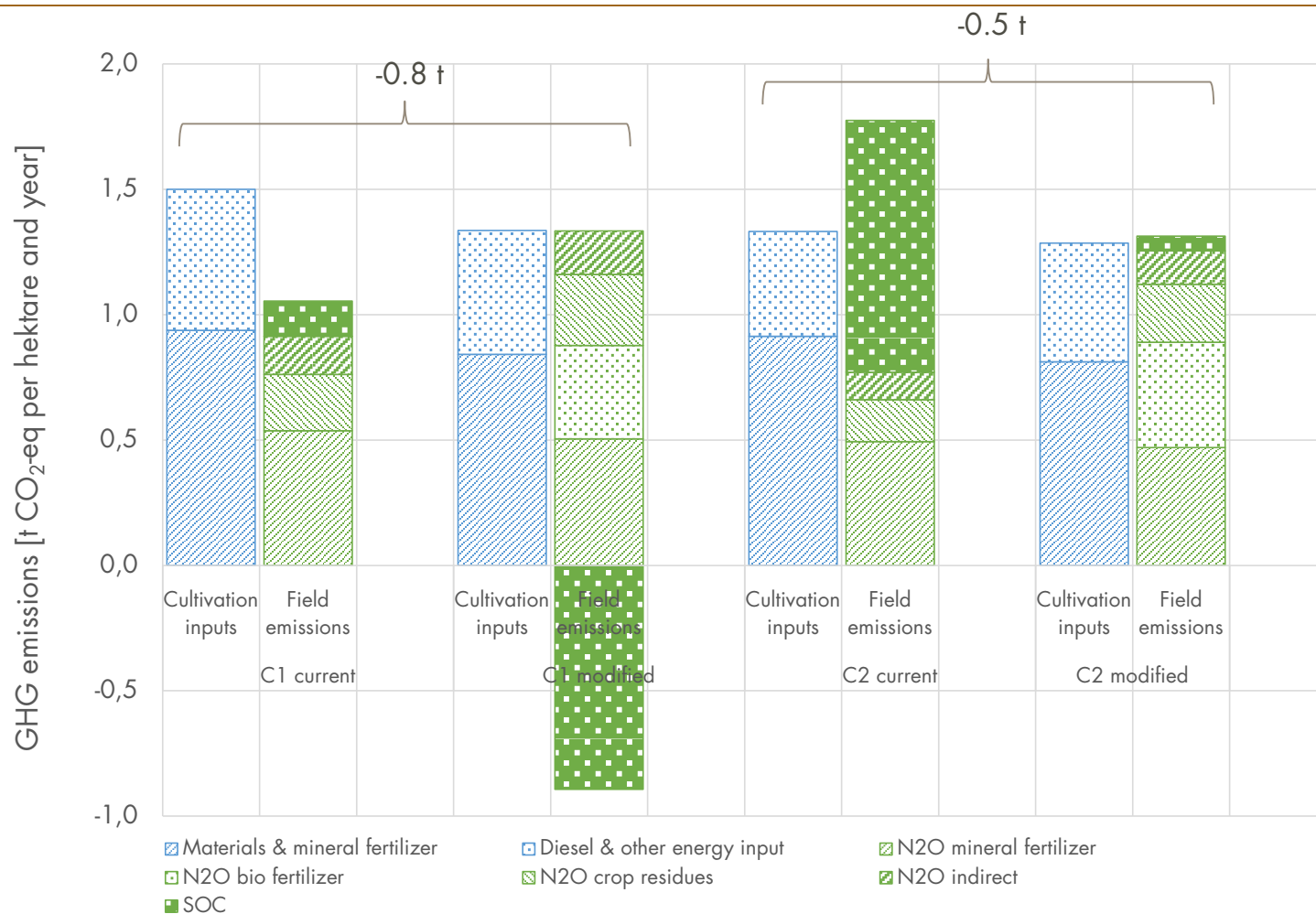
Soil carbon development



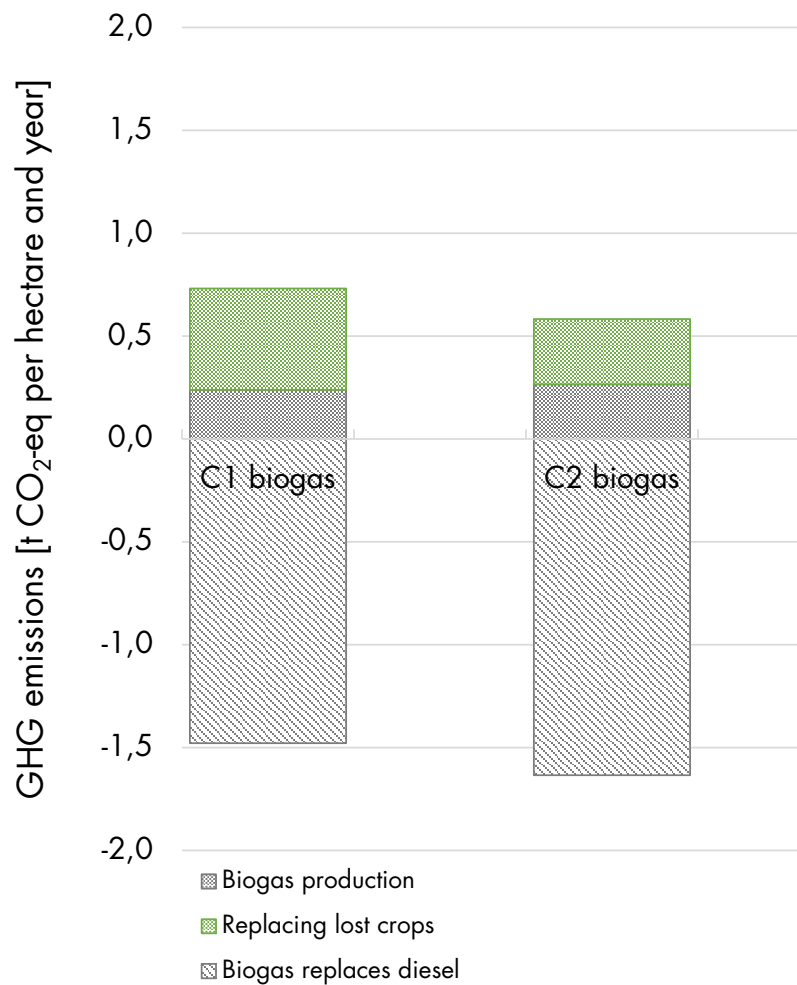
Soil carbon development



GHG perspective



GHG perspective

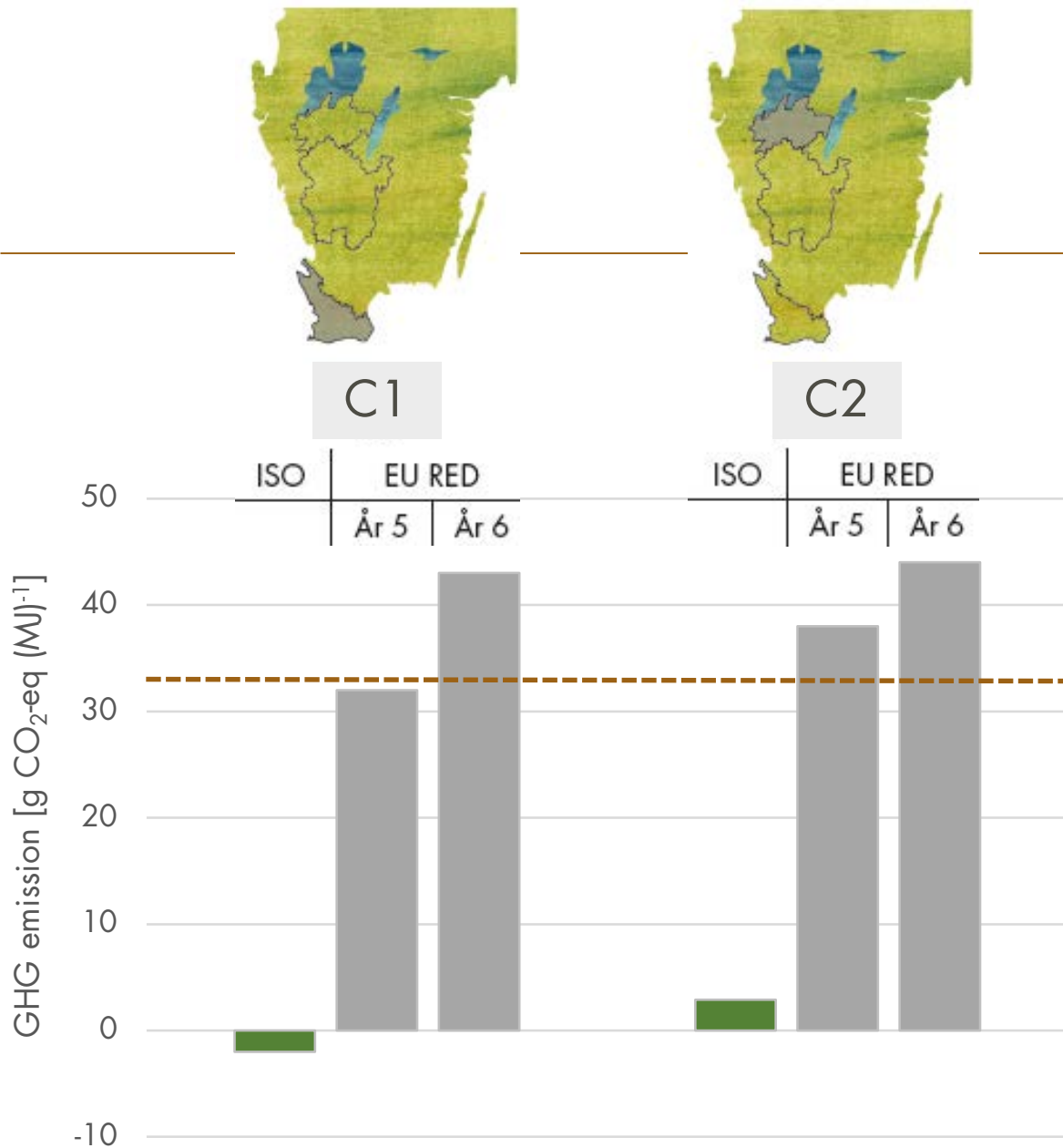


GHG emissions [t CO₂-eq ha⁻¹ a⁻¹]

	Cultivation	The biogas system
C1	- 0,8	- 0,7
C2	- 0,5	- 1,1



EU RED



To summarize

- A sustainable use of arable land should give the lowest possible contribution to greenhouse gas emissions while food production is safeguarded in the long term
- The present, specialized agricultural practice is not sustainable in the long run: Carbon emissions and eventually decreasing crop yields
- To introduce grass cultivation in cereal crop rotations is one approach that can reverse the present carbon loss from arable land
- Important to consider the conflict between the use of arable land for food/feed crops and biomass for energy purposes in any scenario involving the use of land or biomass
- The complexity in sustainability assessments of arable land use requires an improved methodological framework
- Scientifically sound assessments, taking local conditions and spatial perspectives into account, are important in future policies regarding sustainable use of arable land



Read more

Lovisa Björnsson, Thomas Prade & Mikael Lantz (2016) Grass for biogas - Arable land as carbon sink. Report 2016:280. Energiforsk, Stockholm/Malmö, Sweden.

<https://energiforskmedia.blob.core.windows.net/media/20192/grass-for-biogas-energiforskrapport-2016-280.pdf>

Thomas Prade (2016) Soil organic carbon development in a cereal-dominated region – Impact of crop rotation diversification. *10th International Conference on LCA of Food*, 19-21 October 2016, Dublin, Ireland.

Lovisa Björnsson & Thomas Prade (2016) Arable land as carbon sink – a regional case study on greenhouse gas emission impact of diversifying cereal based crop rotations. *10th International Conference on LCA of Food*, 19-21 October 2016, Dublin, Ireland.

Lovisa Björnsson, Thomas Prade & Mikael Lantz (2016) Åkermark som kolsänka – en utvärdering av miljö- och kostnadseffekter av att inkludera gräsvall för biogas i spannmålsrika växtföljder. Rapport Nr 98, Miljö- och energisystem, Lunds Universitet, Lund, Sweden.

<http://lup.lub.lu.se/record/c4b9d90c-c7f6-4481-b094-3e2e3fa6ad89>



LUNDS
UNIVERSITET

Lovisa Björnsson
Professor
Environmental and Energy Systems Studies

lovisa.bjornsson@miljo.lth.se
046-222 8324
www.miljo.lth.se

