



SCIENCE AND
EDUCATION **FOR**
SUSTAINABLE
LIFE

The potential of intermediate crops and crop residues as sustainable biomass feedstock in Sweden

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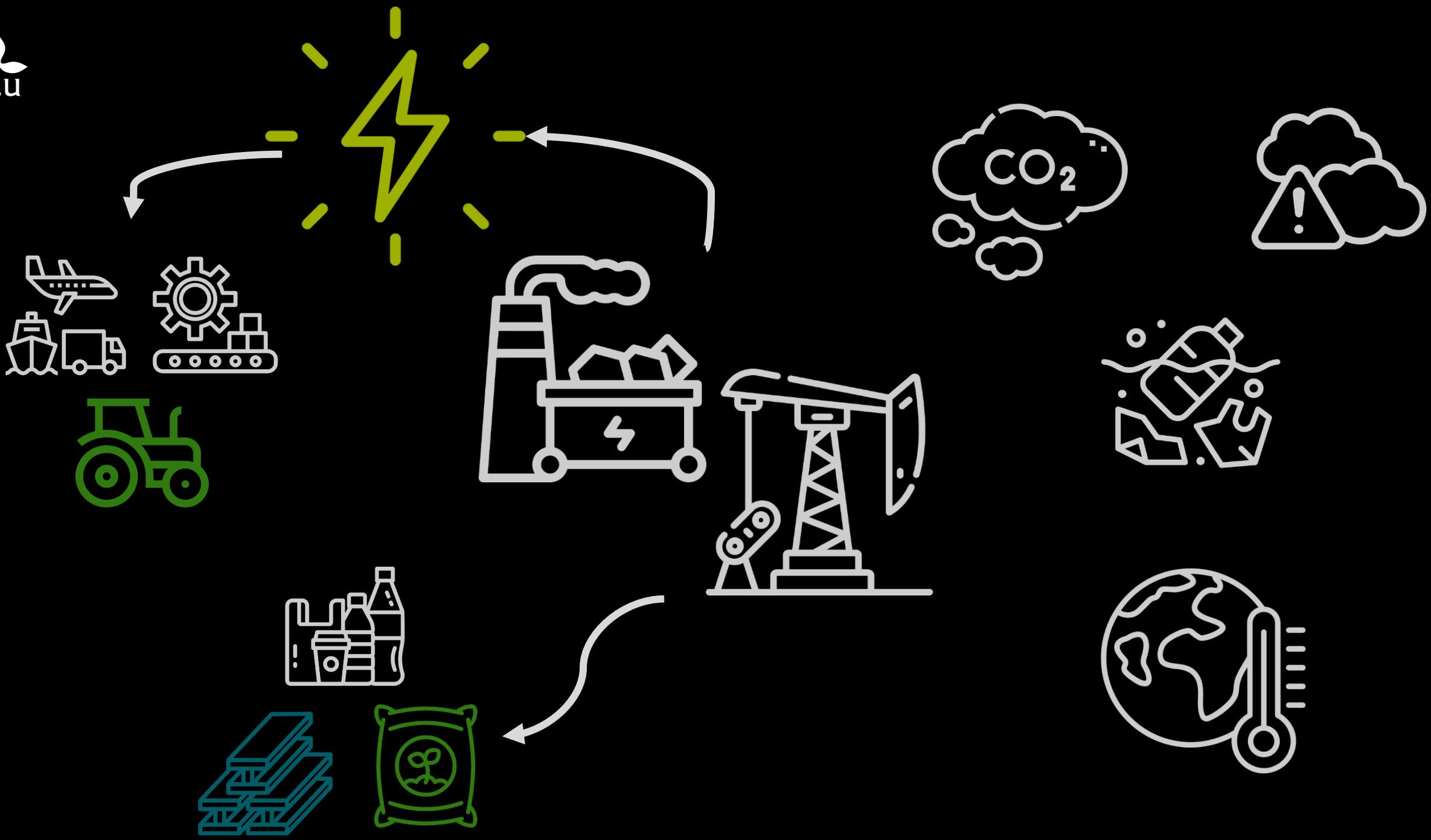


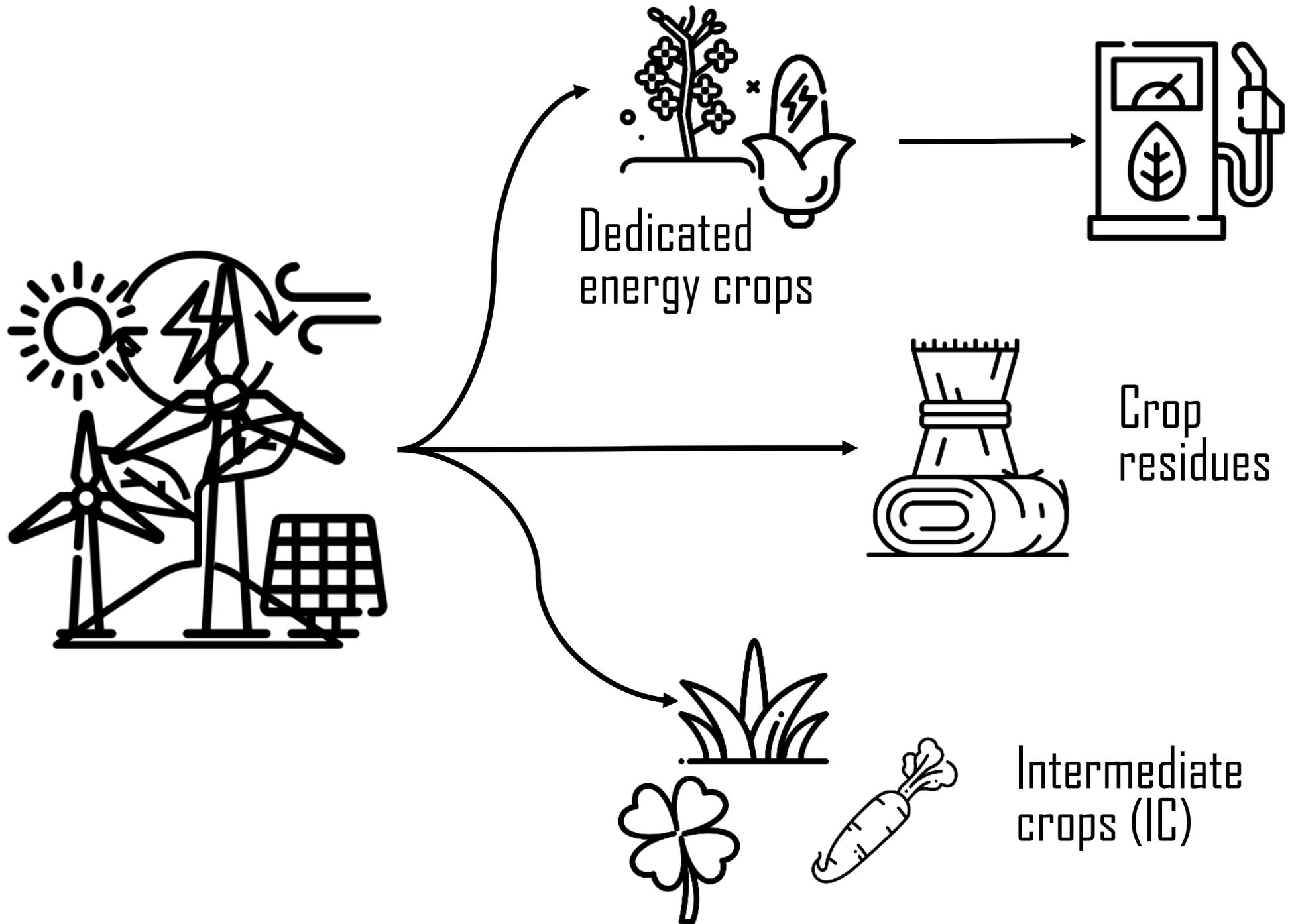
Maria Viketoft

Outline

1. Biomass and the bioeconomy
2. Research questions
3. Biomass potentials: crop residues and intermediate crops
4. Effects on soil carbon
5. Current work: N emissions and LCA
6. Conclusions

Biomass and the bioeconomy





Research questions

Can we make a sustainable use of crop residues and IC in Sweden?

How much?

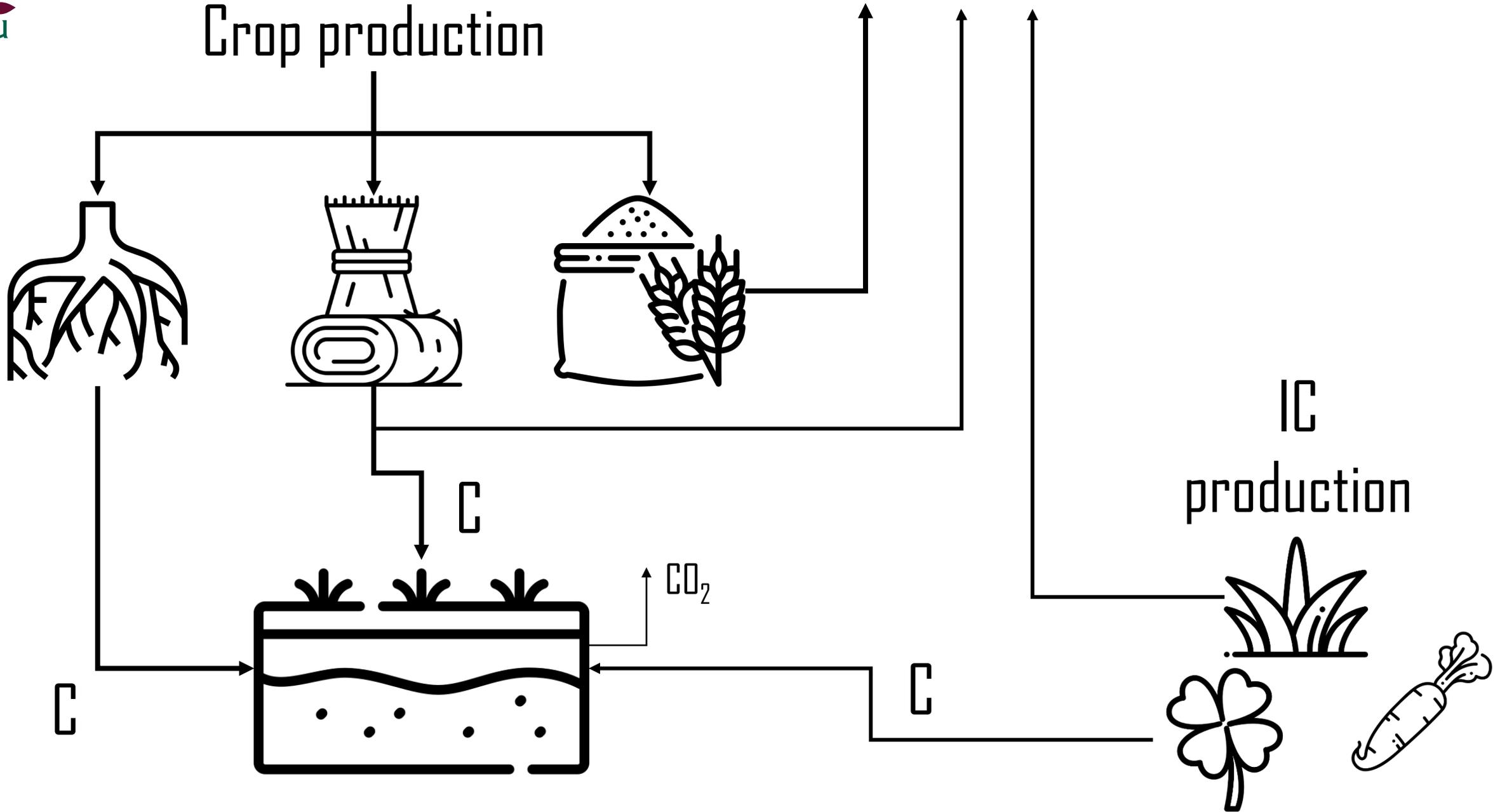
Consequences? (Soil, carbon, nitrogen...)

Feasibility?

What is the best strategy?

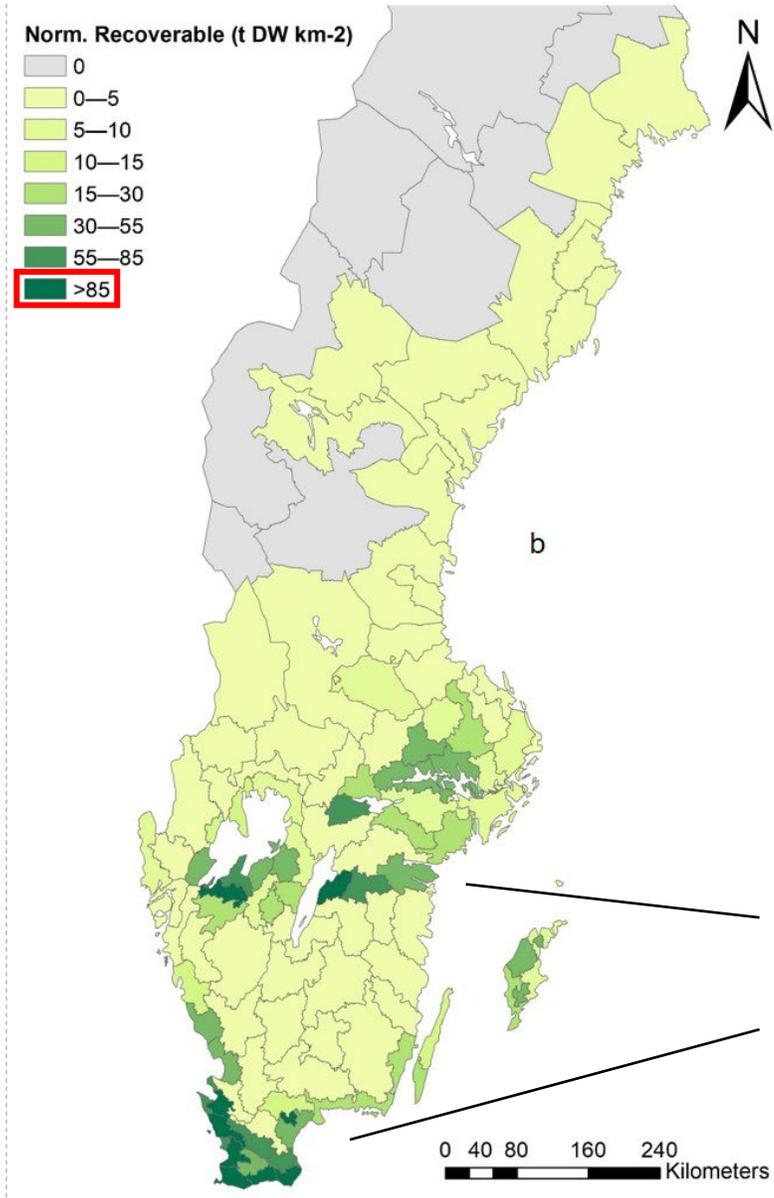
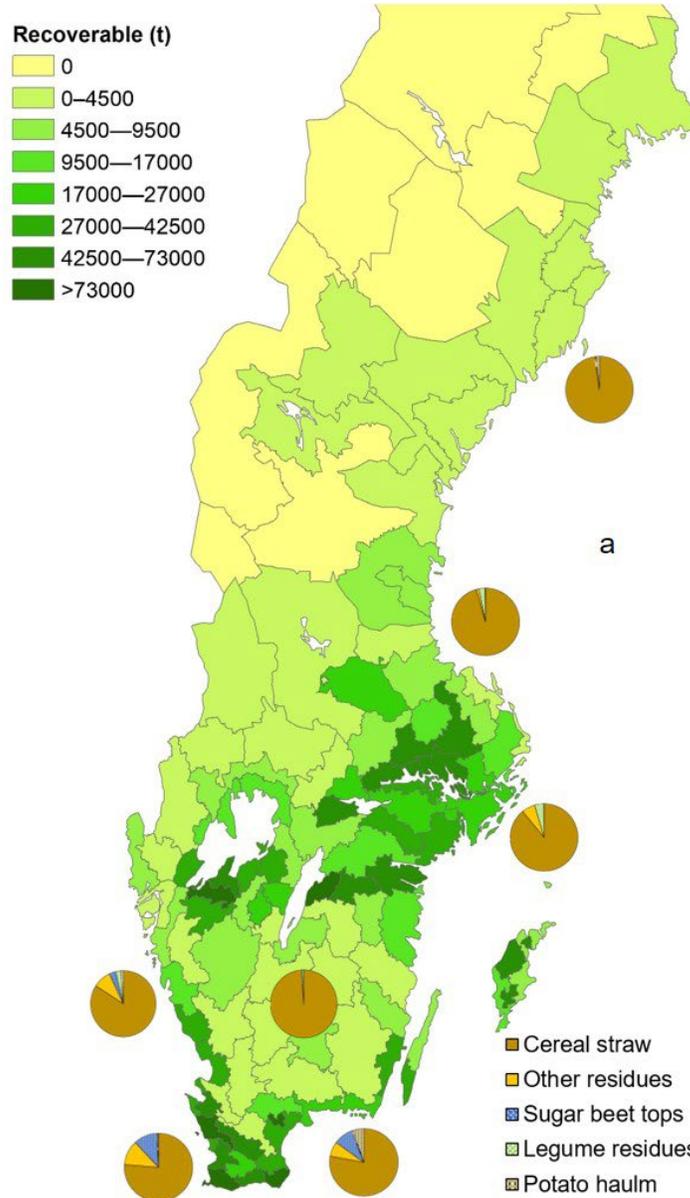
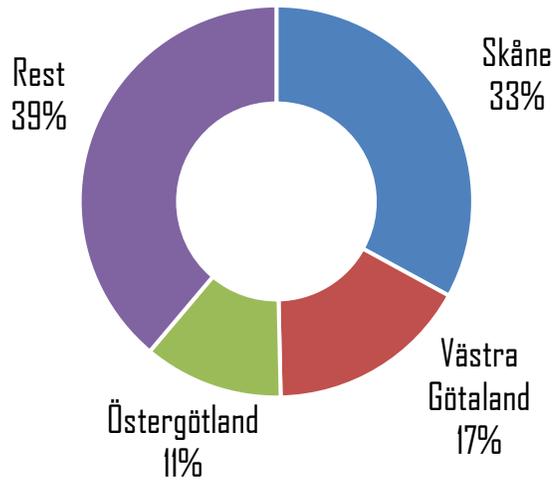
Biomass potentials: crop residues and intermediate crops

Crop production



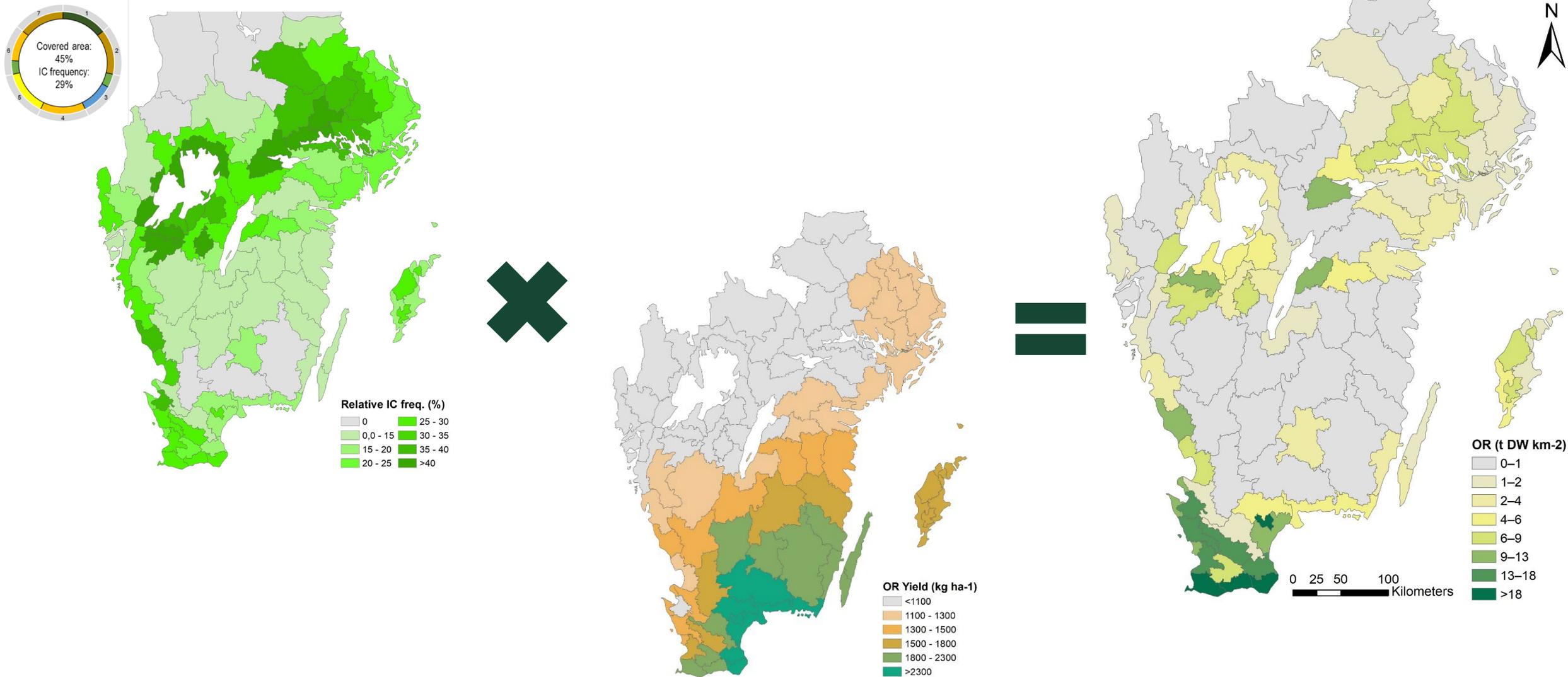
Residue availability

17 agricultural crops
"Recoverable"



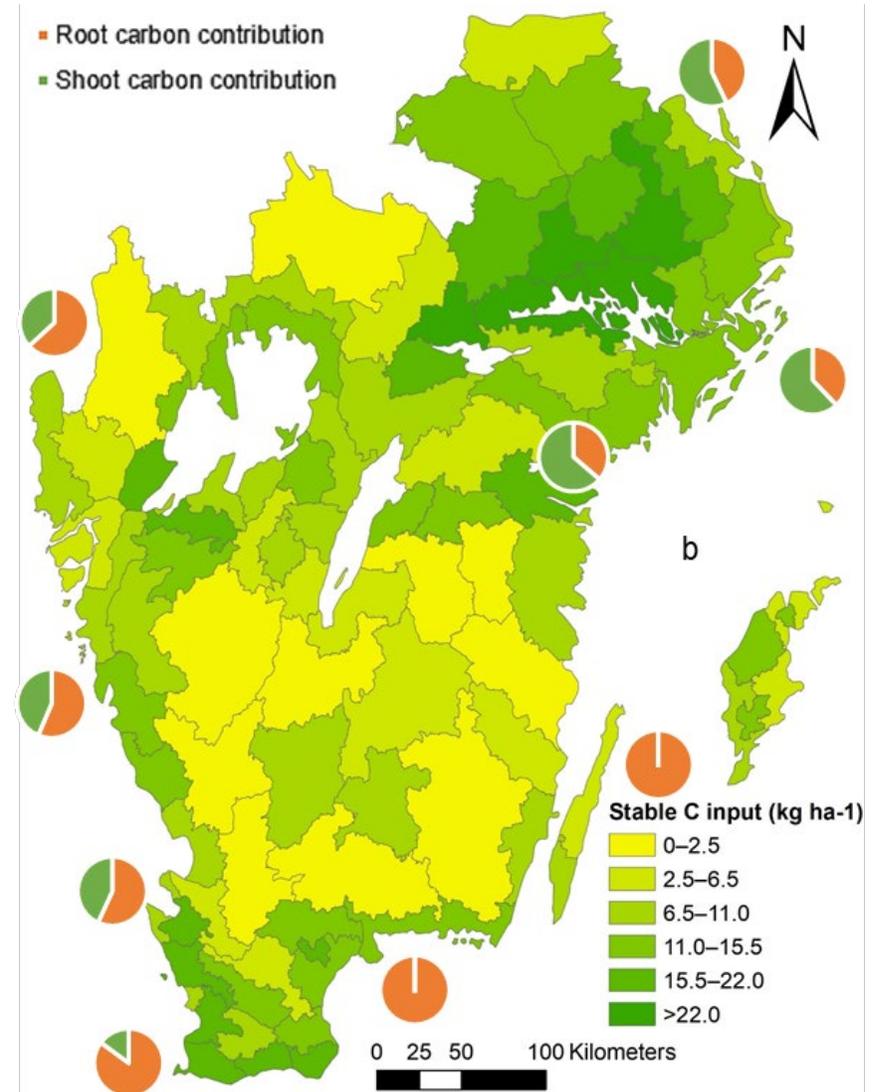
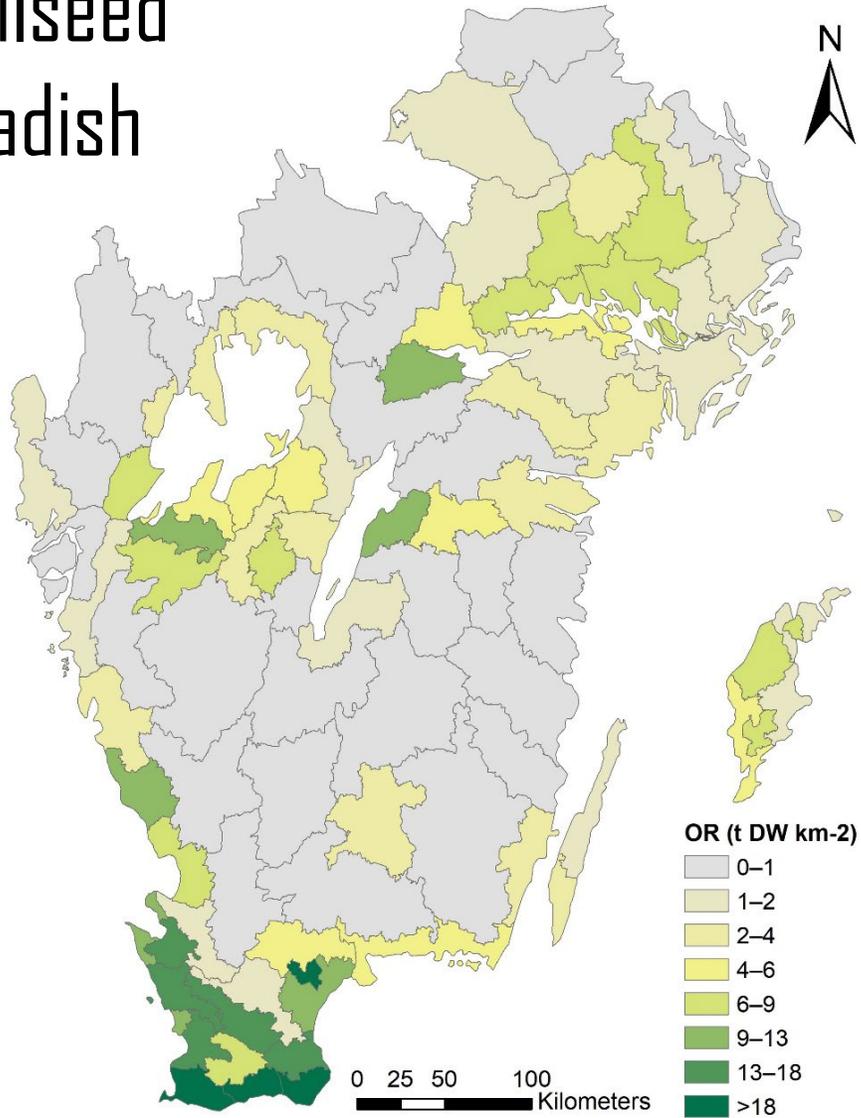
30%
of total national
residual biomass

IC: Oilseed radish biomass

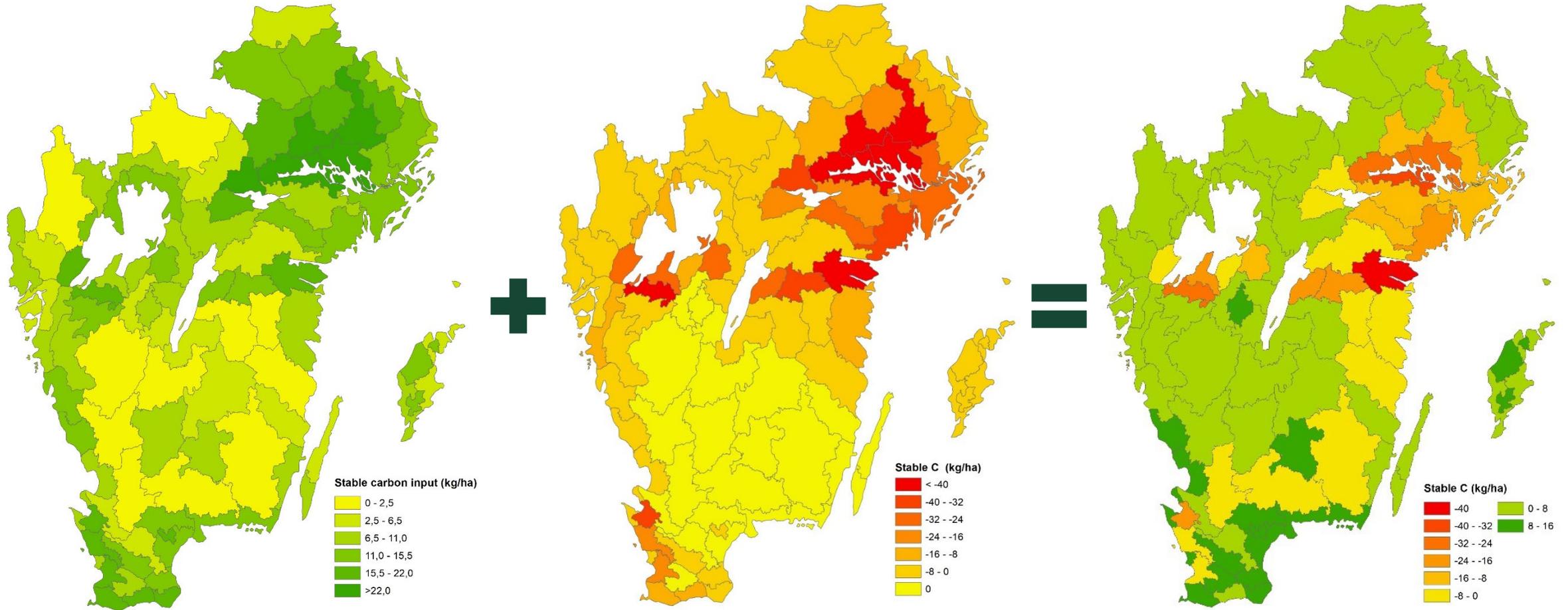


Effects on soil carbon

IC biomass: Oilseed radish



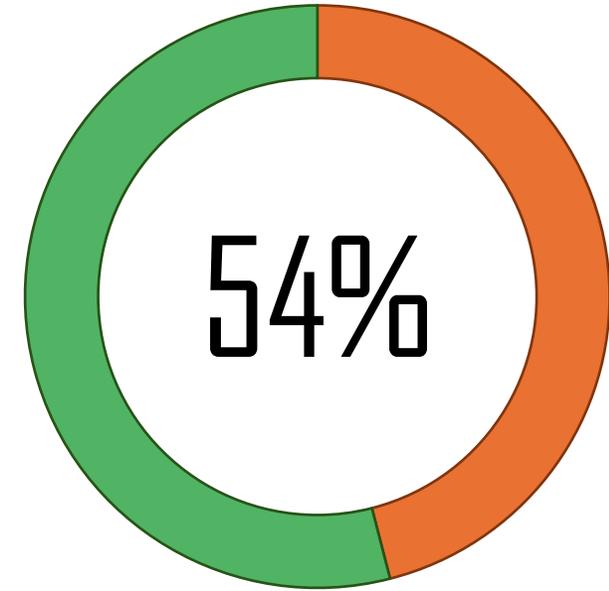
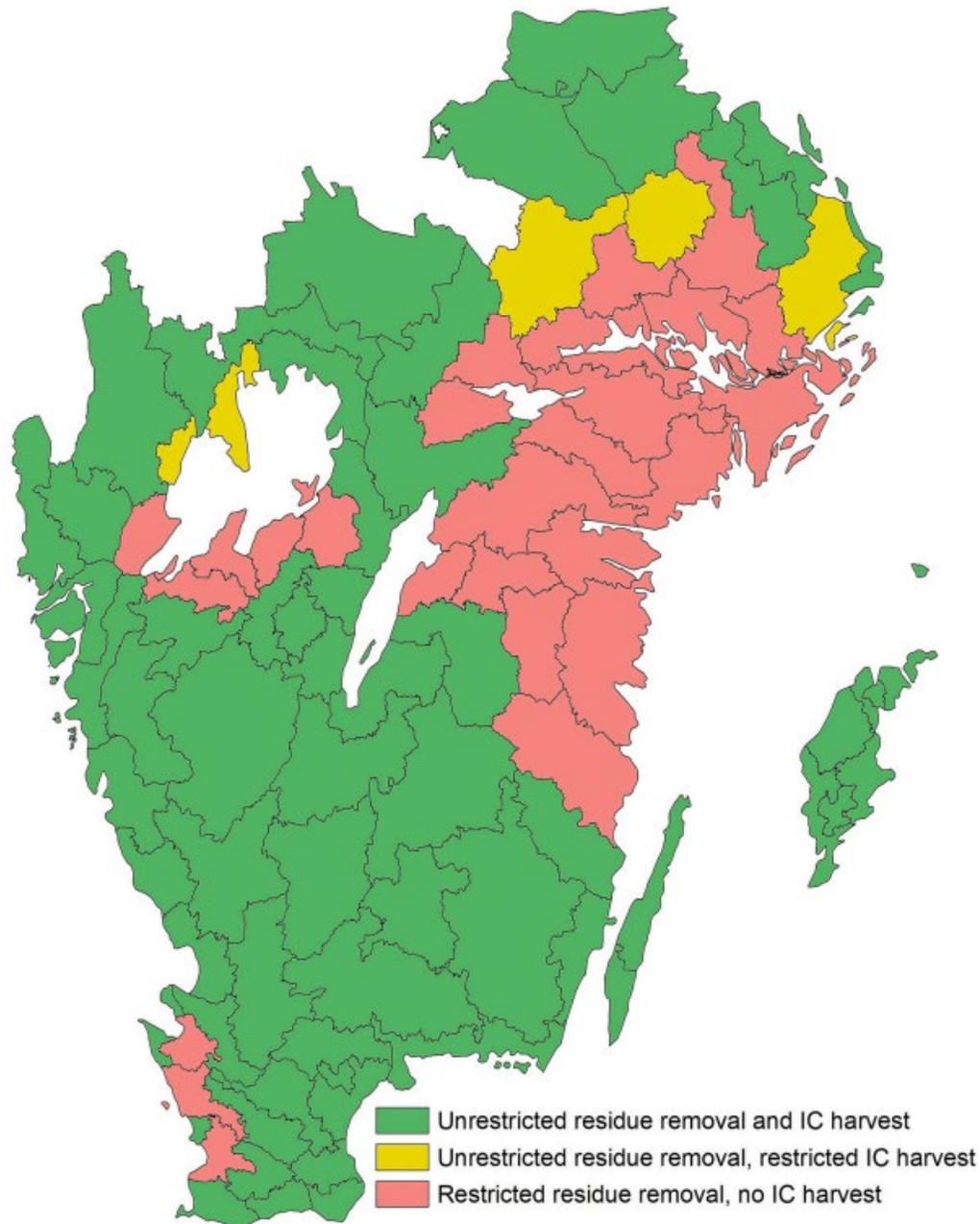
Impact to stable C inputs



IC contribution

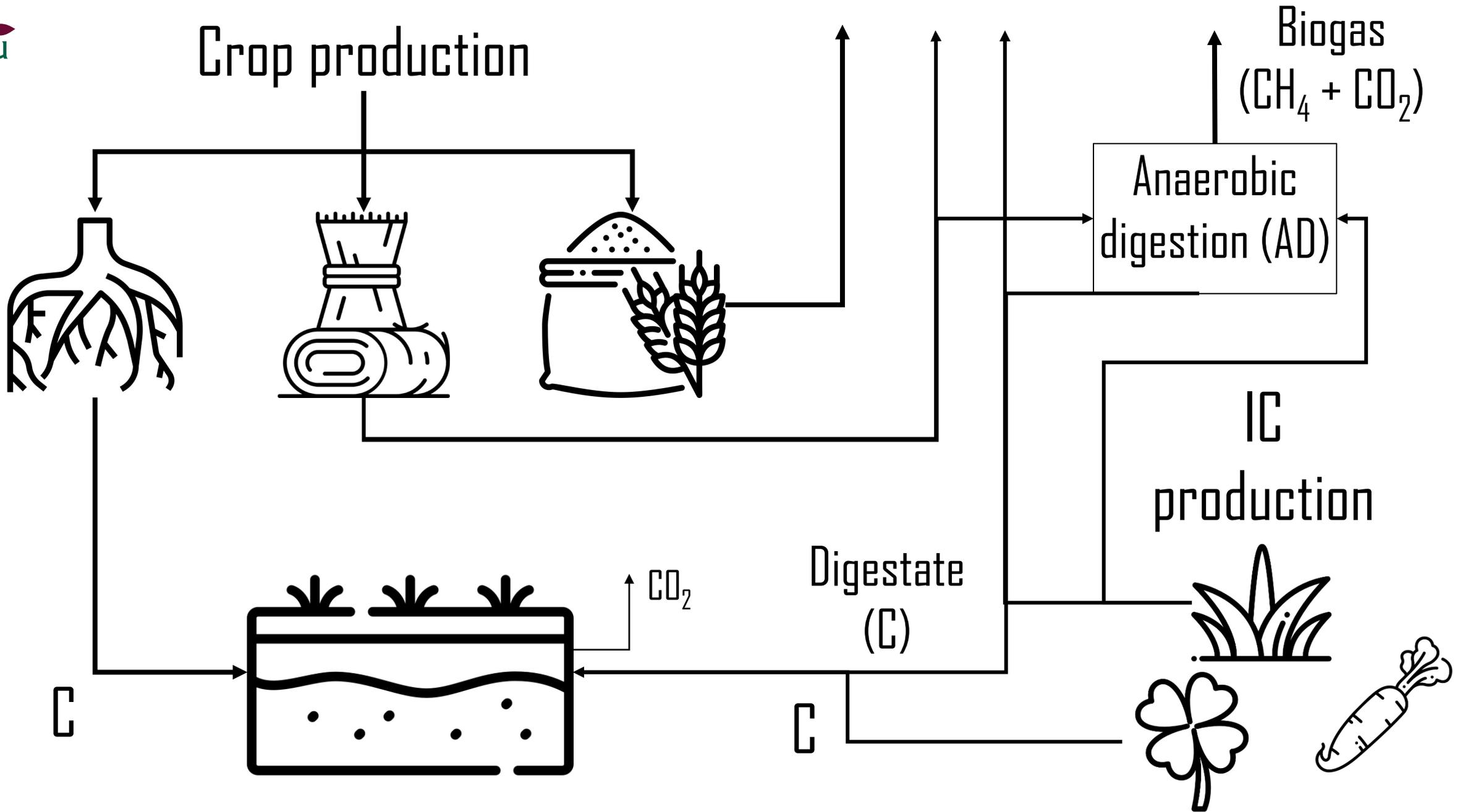
Residue removal

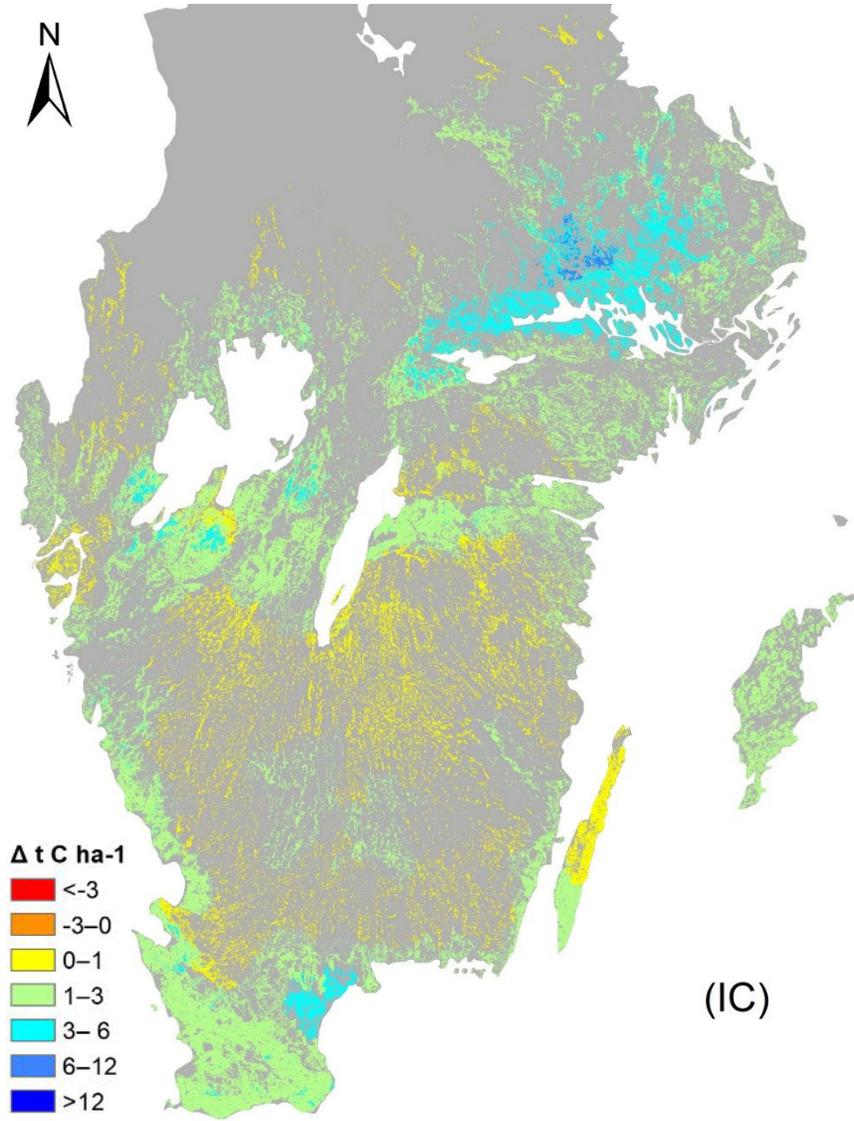
Residue removal + IC



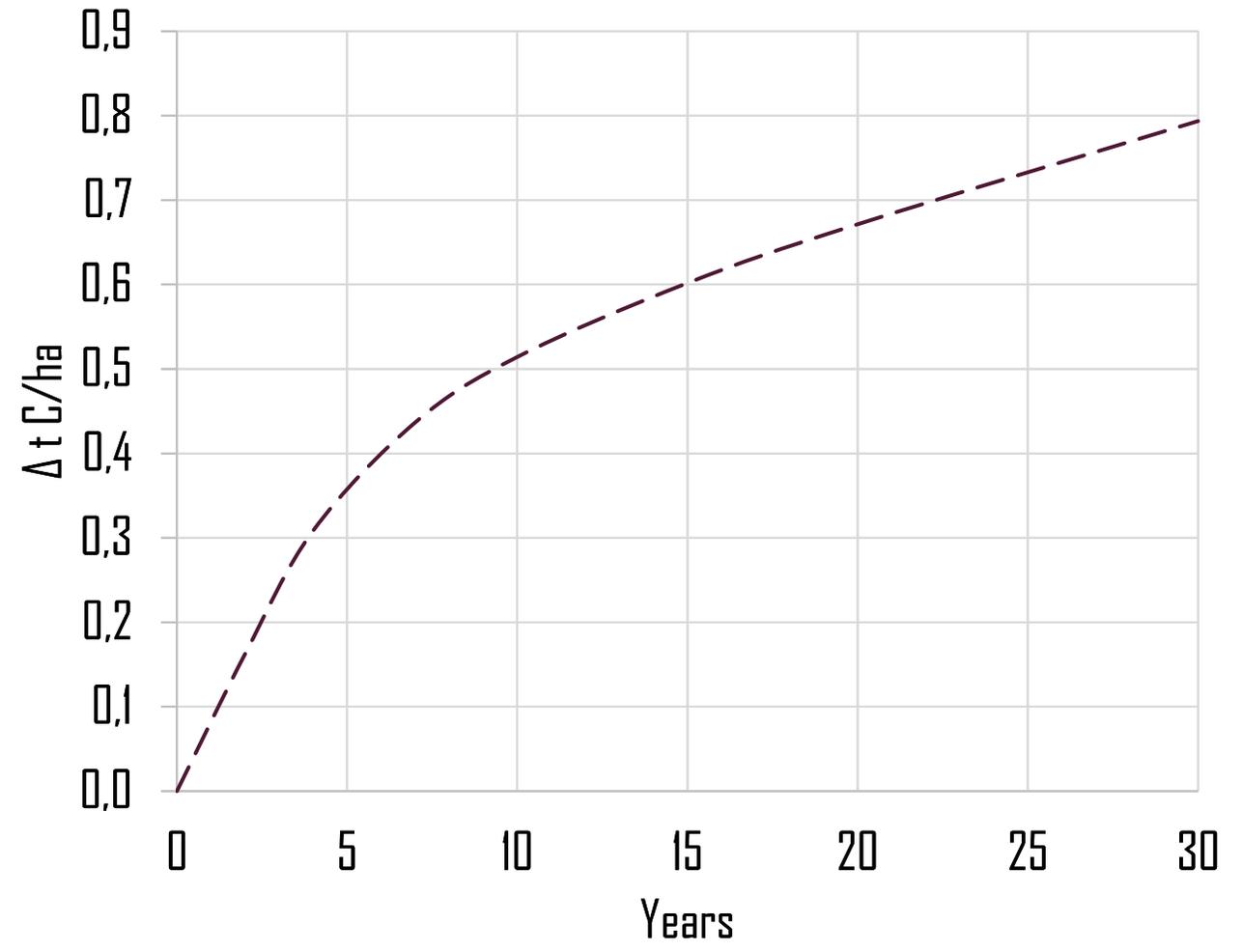
... of arable land, IC cultivation offsets negative effects of crop residue removal

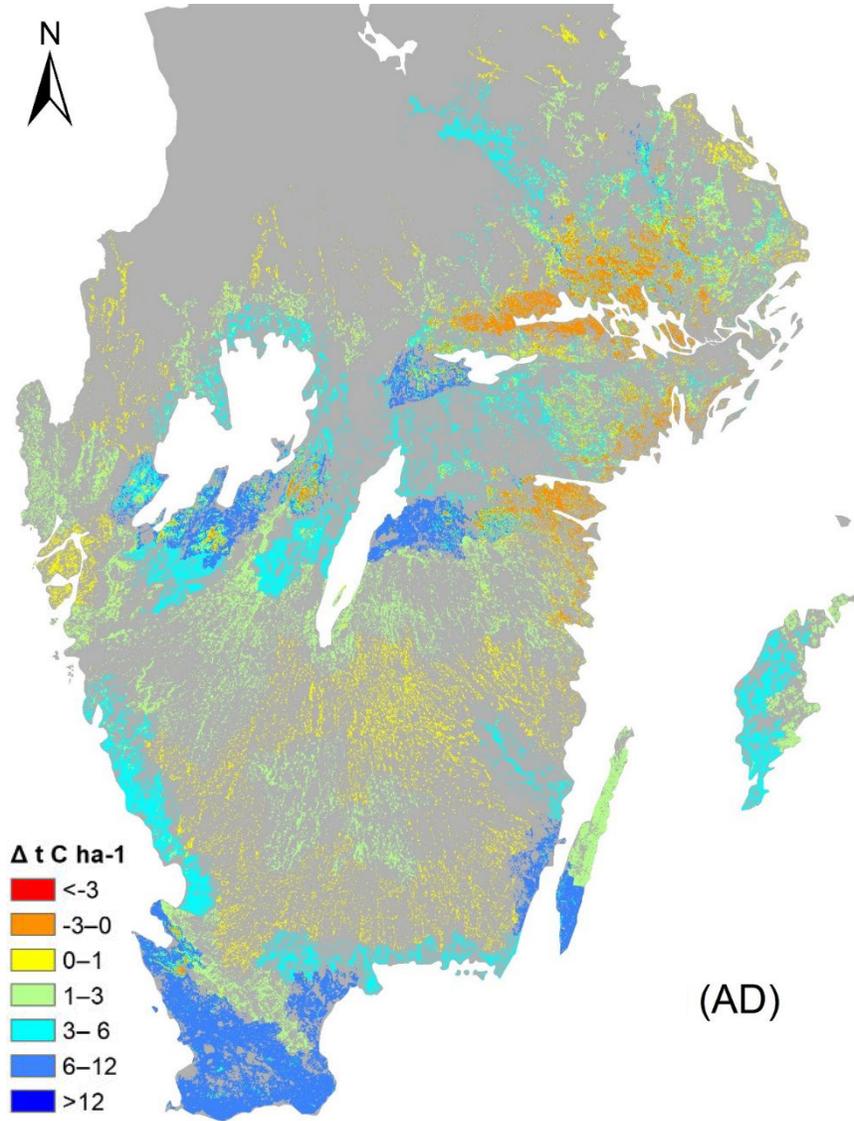
Fig. 6. Recommendation based on potential of IC to compensate for the effect of residue removal on potentially stabilized organic carbon inputs.



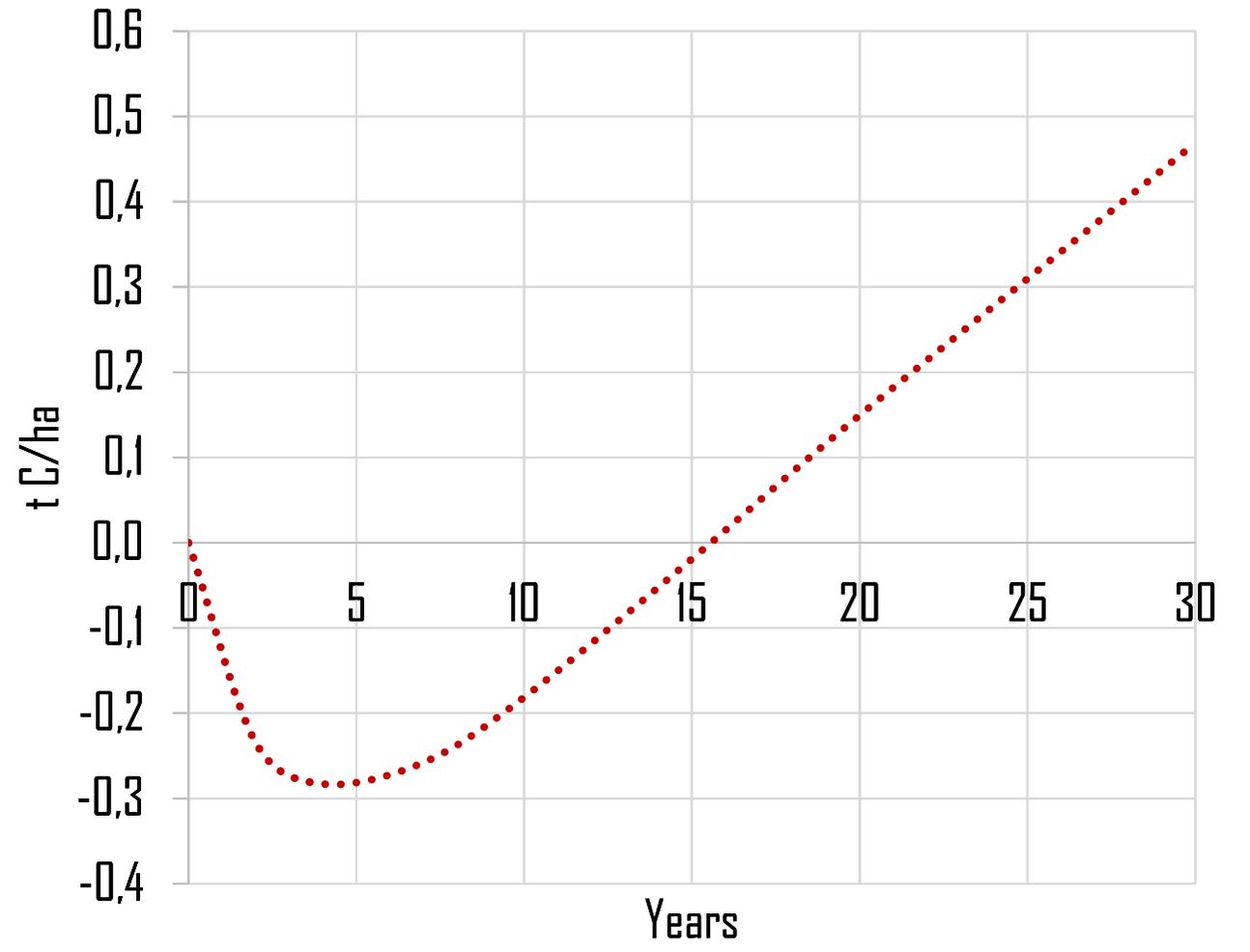


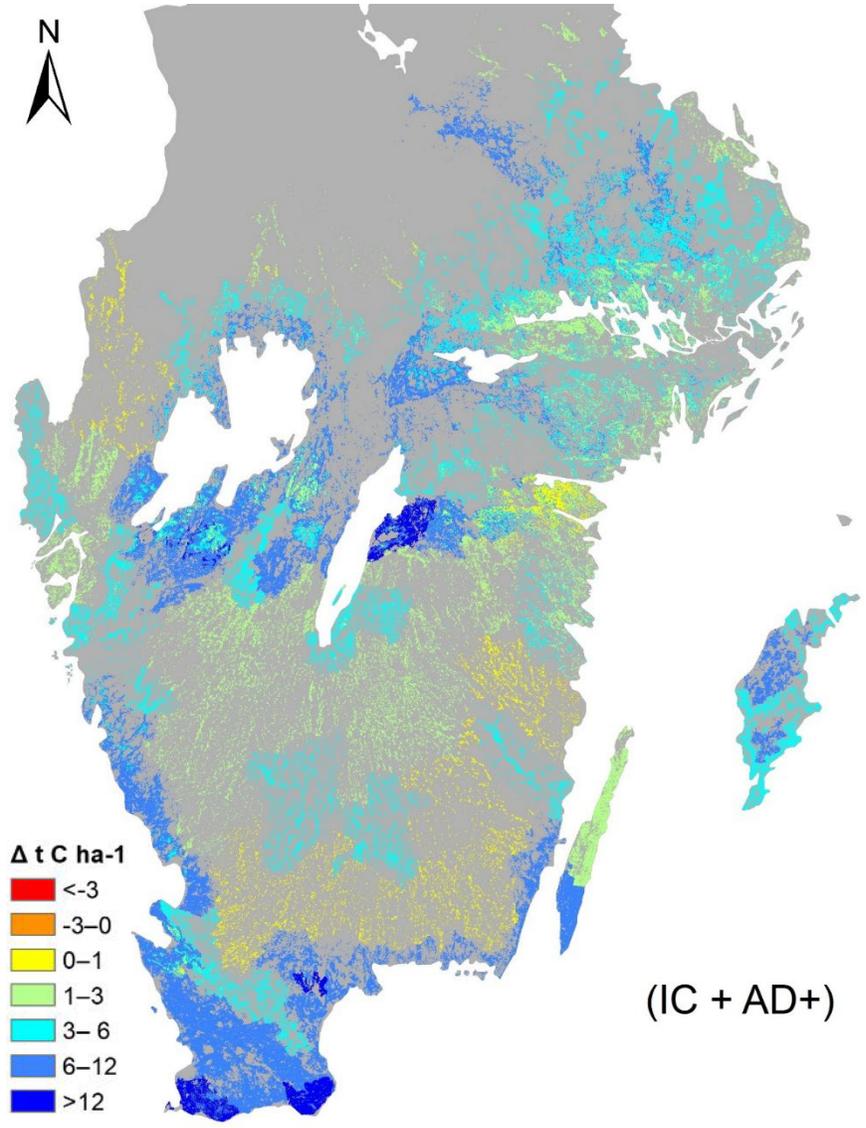
IC cultivation



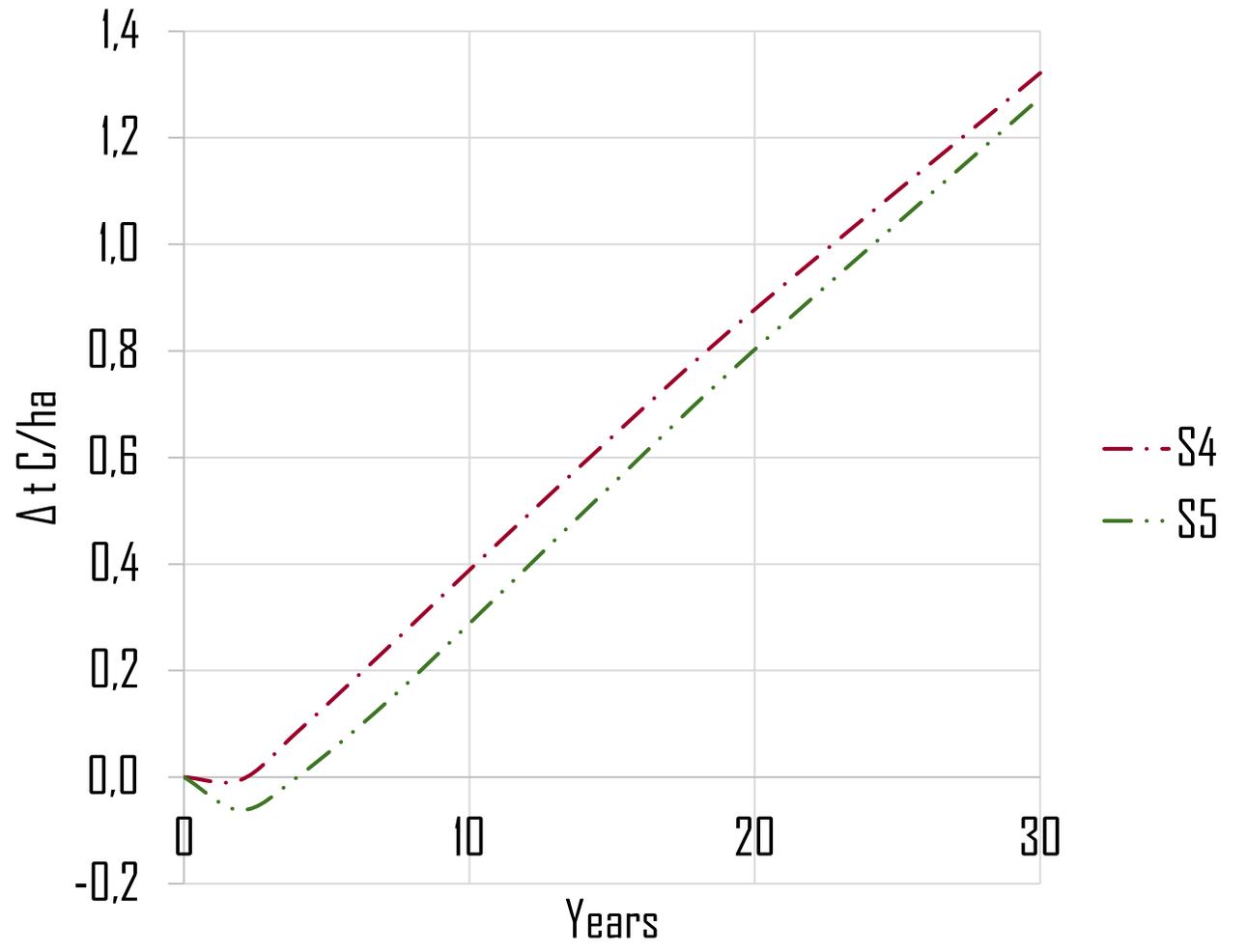


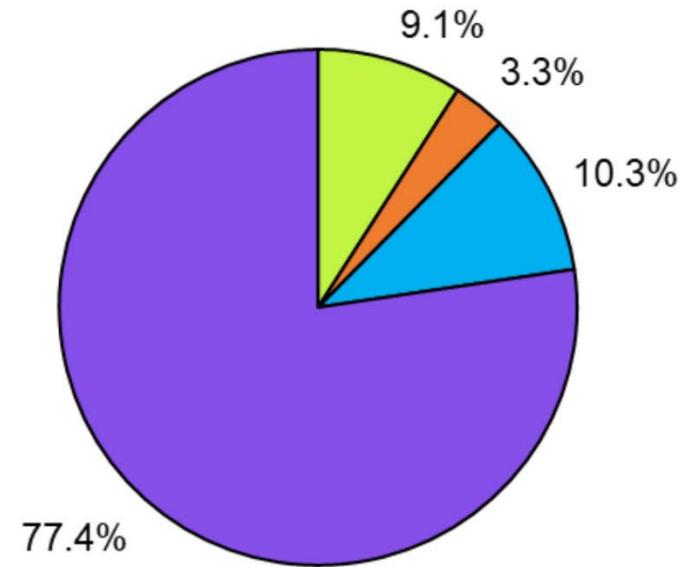
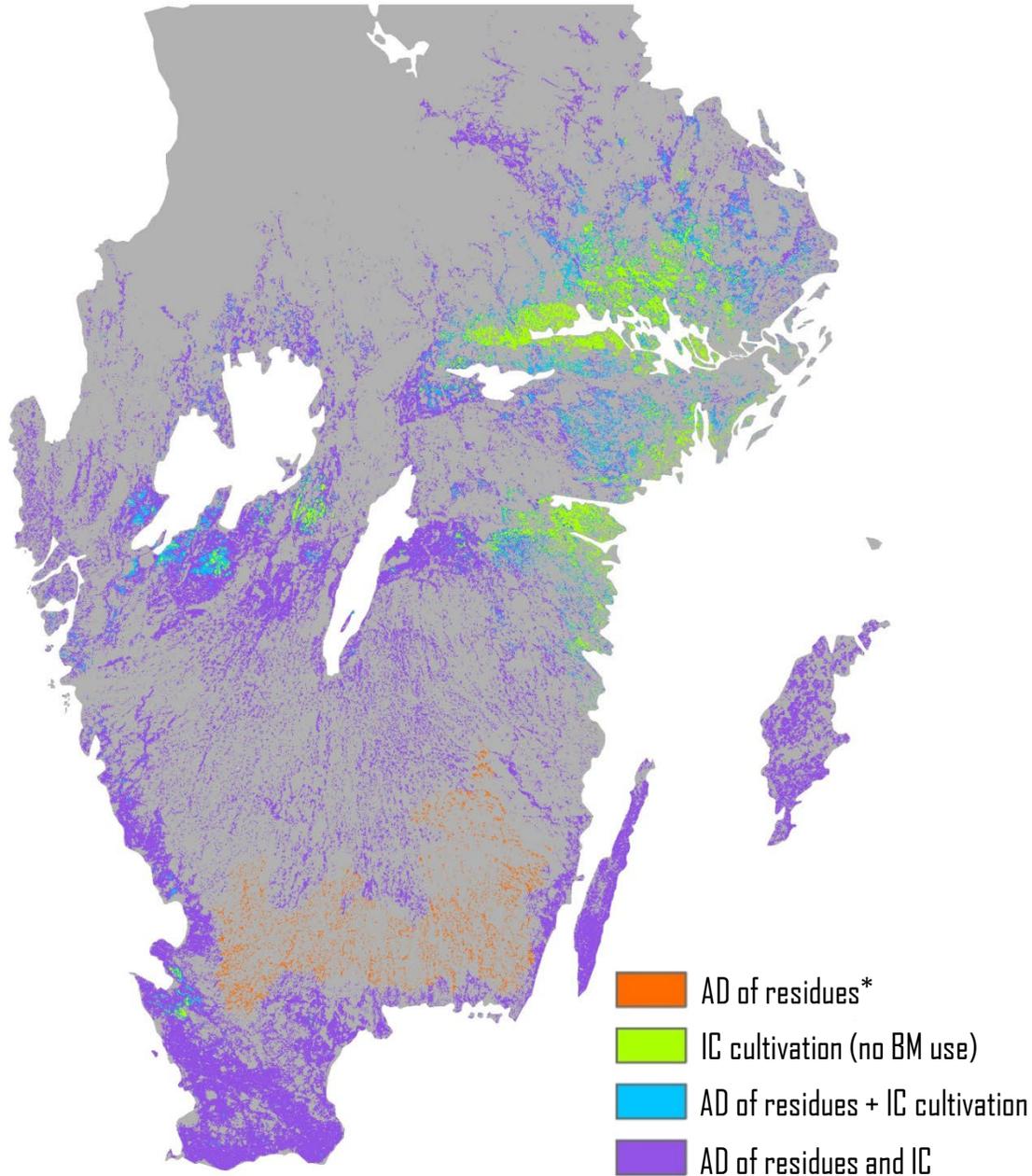
AD of residues





IC cultivation and AD





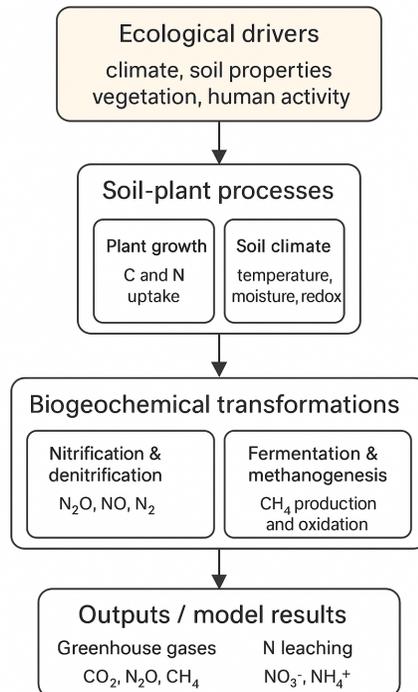
77-88%
of arable land benefits from IC
cultivation and AD of
agricultural biomass

Current work: N emissions and LCA

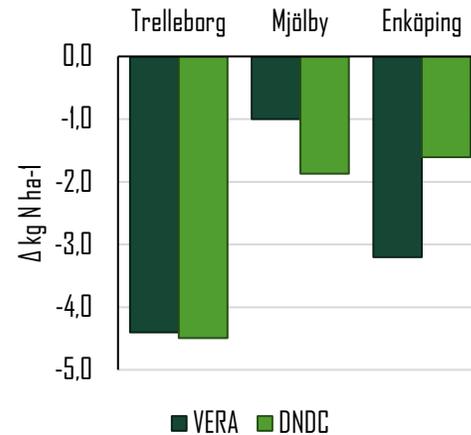
Current work

- How do IC and AD of non-food biomass affect N emissions? (NO_3^- , N_2O , NH_3)
- Nitrogen modelling – preliminary results

DNDC Model



IC effect on leaching (NO_3^-)



Fertilizer value of digestates:

3-7% of total N demand in a rotation

(10-45% for individual spring crops)

Outlook

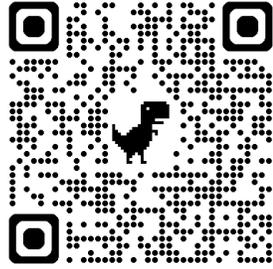
- Assessment of environmental impacts: LCA
- Techno-economic assessment
- Biodiversity...

Conclusions

Conclusions

- IC are beneficial for SOC + BM availability ~ varying effects.
- AD of crop residues → positive effect on SOC and climate impact.
- IC and digestate application can aid in fulfilling environmental goals.
- BM management can reduce N emissions and fertilizer demand

Thank you for your attention!



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Exploring the benefits of intermediate crops: Is it possible to offset soil organic carbon losses caused by crop residue removal?

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Managing Soil Carbon Sequestration: Assessing the Effects of Intermediate Crops, Crop Residue Removal, and Digestate Application on Swedish Arable Land

Sergio Alejandro Barrios Latorre¹ | Lovisa Björnsson² | Thomas Prade¹



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