



N O R S Ø K

Norsk senter for økologisk landbruk

 SOM 2022

# Carbon for benefit of the farmer

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# Norwegian Centre for Organic Agriculture (NORSØK)



## Core areas :

- Recycled fertilisers
- Soil fertility
- Soil health
- Climate effects of agriculture
- Animal health and welfare



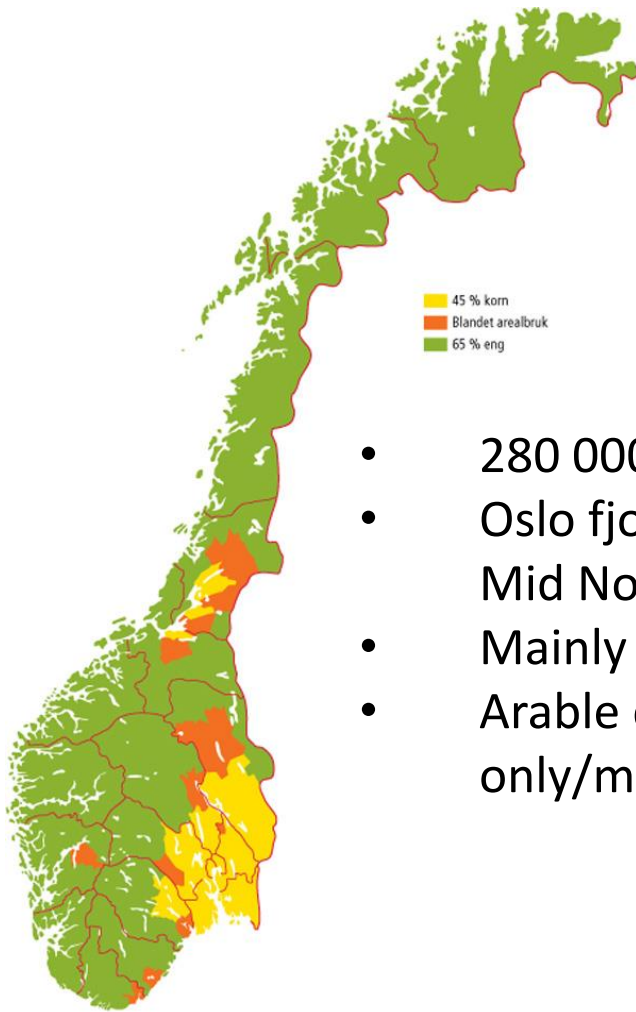
# Carbon for benefit of the farmer

## Objective

Crop rotations with grassland and application of animal manure have been regarded as measures to enhance the content of organic matter and thus soil carbon storage and health. However, few investigations have been done at farm level.

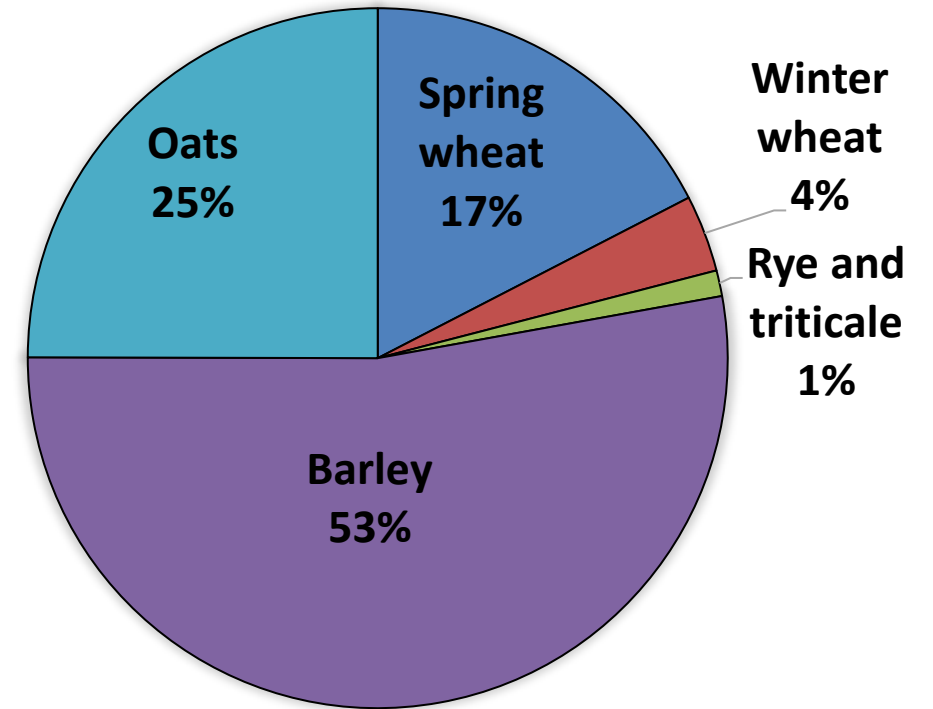


# Cereal production in Norway



- 280 000 ha
- Oslo fjord area, Inland area and Mid Norway
- Mainly stockless farming systems
- Arable cropping with cereals only/mainly

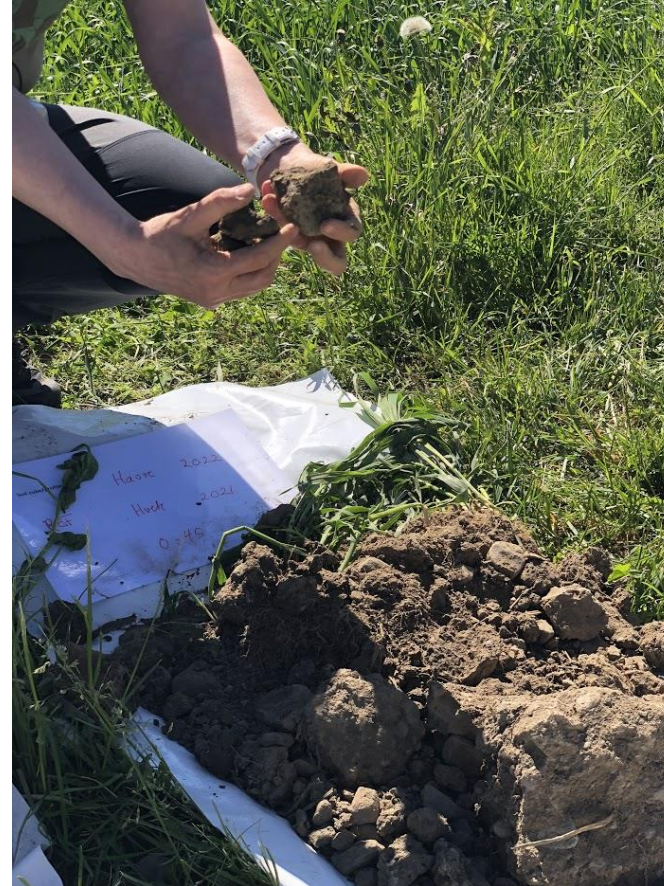
Area distribution





# Carbon for benefit of the farmer

- Farms
- Soil indicators
- Impacts on C storage and soil health



# Carbon for benefit of the farmer

## Methods



# Carbon for benefit of the farmer

## Methods

8 farms at each site



4 arable farms



4 farms with ley in the  
crop rotation





# Carbon for benefit of the farmer

## Methods

8 farms at each site



4 arable farms



4 farms with ley in the  
crop rotation



2 sites  
per farm



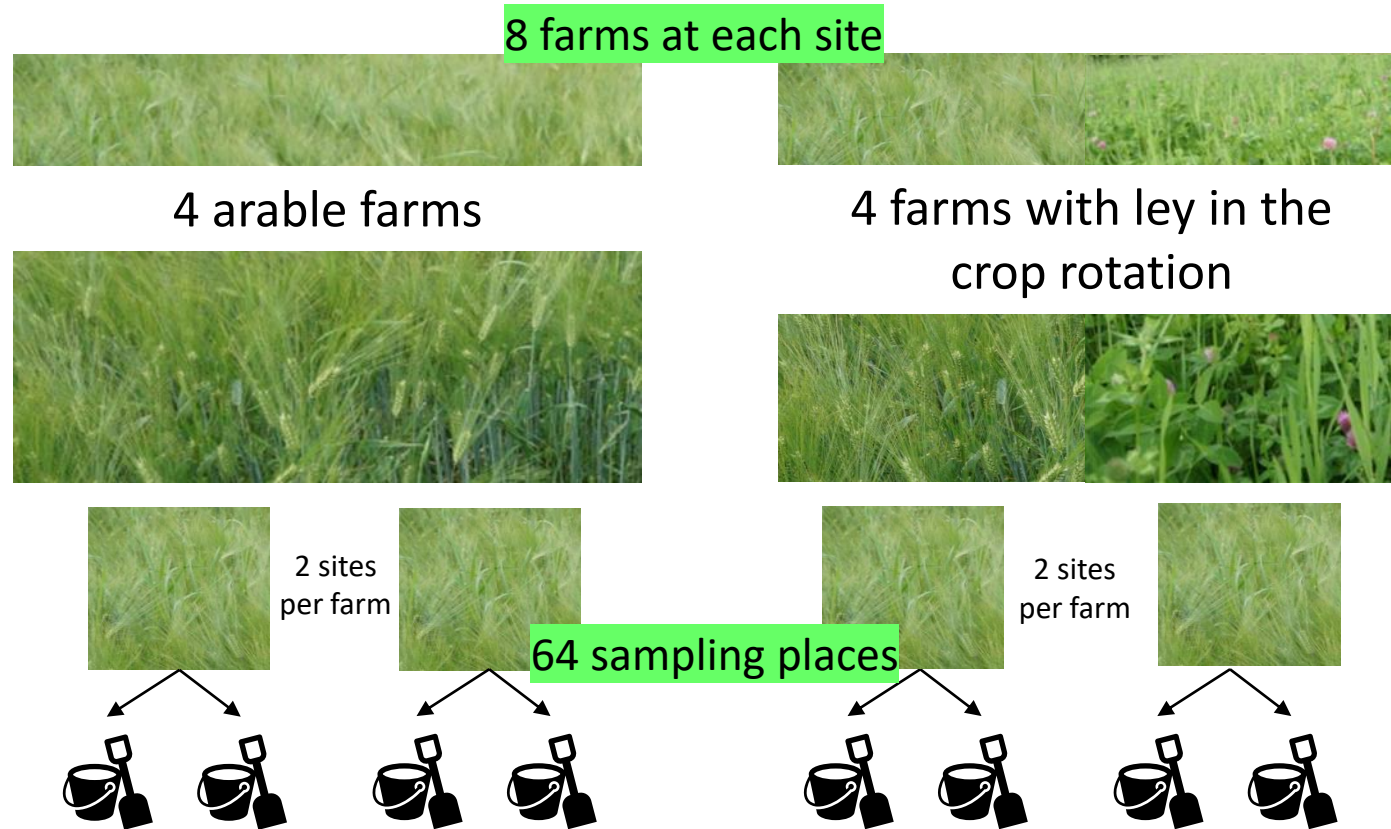
2 sites  
per farm



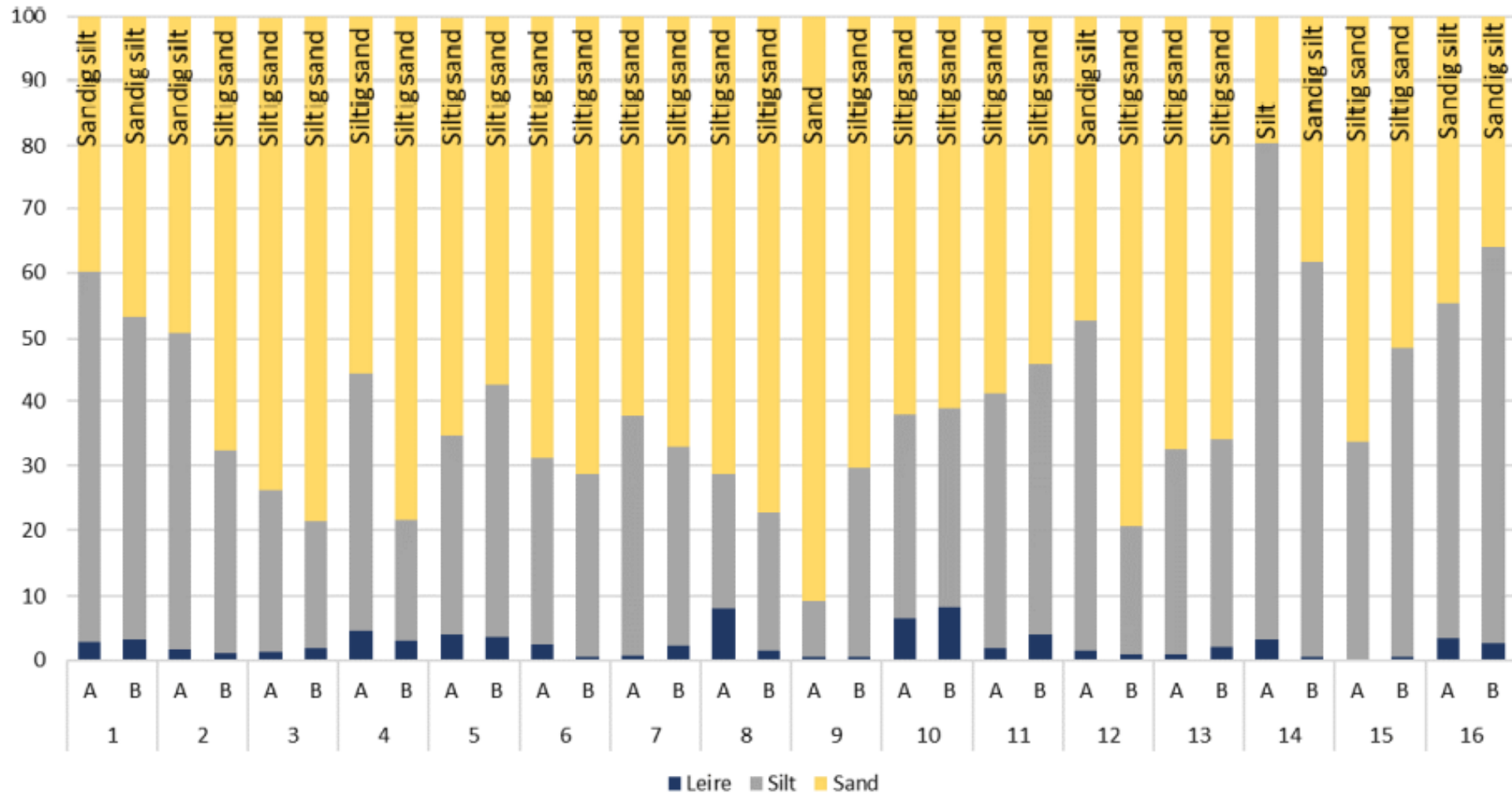


# Carbon for benefit of the farmer

## Methods



# Carbon for benefit of the farmer



Sandy / Silty soils



# Carbon for benefit of the farmer



## Indicators

- Carbon content
- Active carbon
- Soil respiration
- Earthworms
- Plant residues
- Cotton cloth
- Tea-bag
- Soil structure
- Aggregate size
- Aggregate stability
- Root depth
- Penetration depth
- Infiltration
- Pore Volume





# Challenges : variations

- Soil texture, drainage conditions, natural content of soil organic matter, weather

Dry – early in season

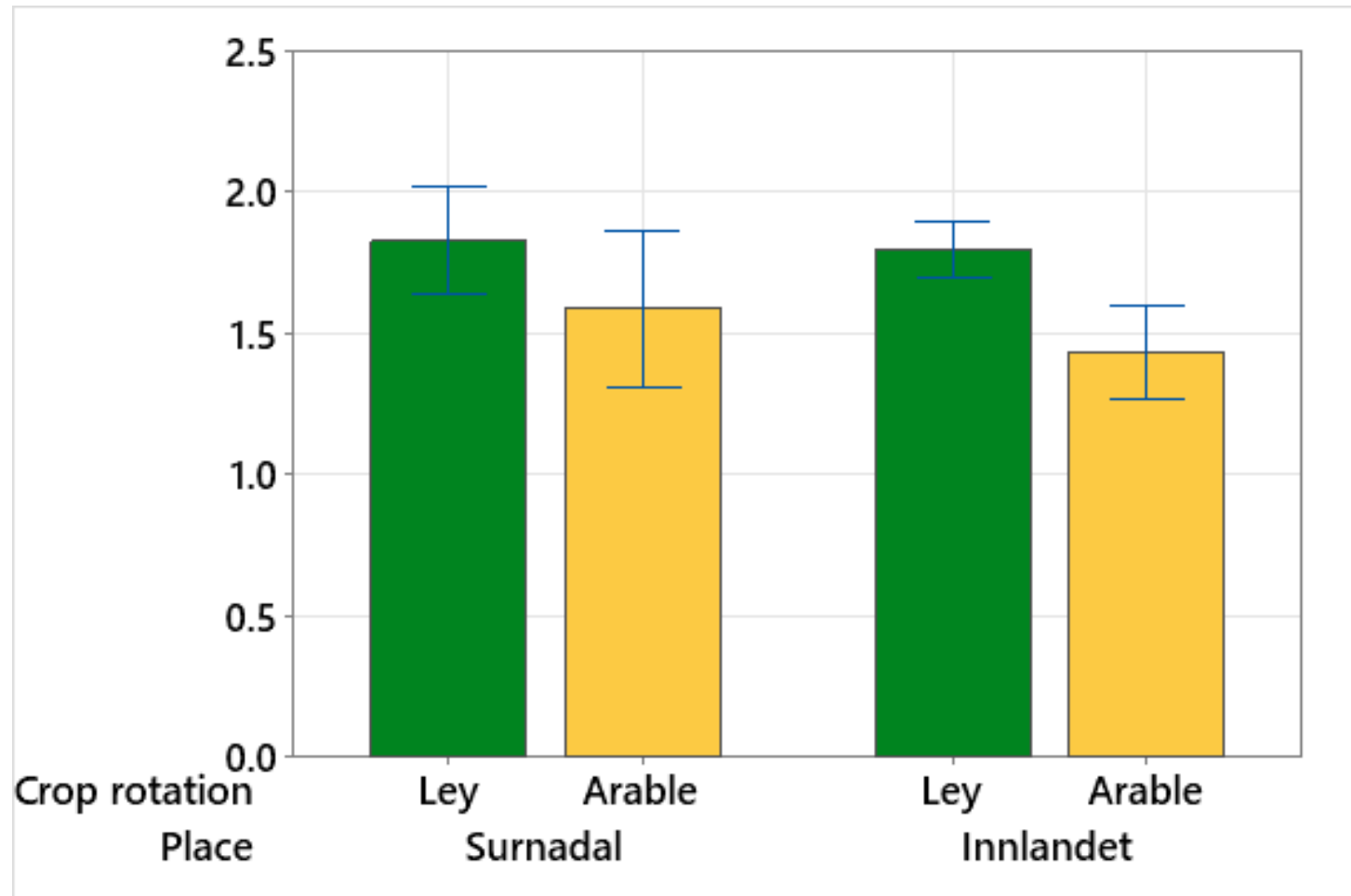
Wet – after harvest of the cereals





# Effect of crop rotation on carbon storage

% Organic C (0-20 cm)



Ley in the crop rotation

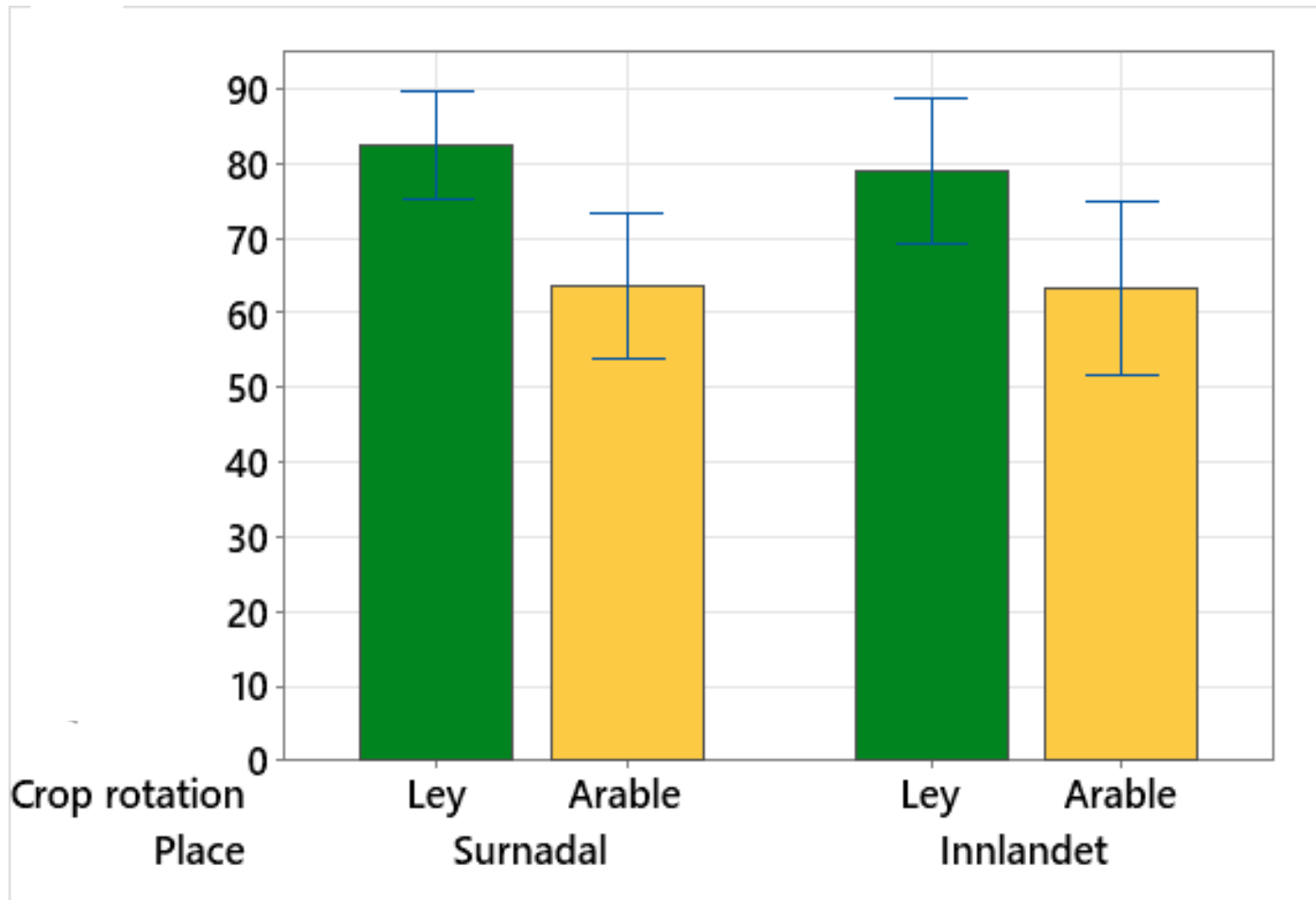


Arable farms



# Effect of crop rotation on aggregates stability

% Soil aggregate (2-6 mm) - stability



Ley in the crop rotation



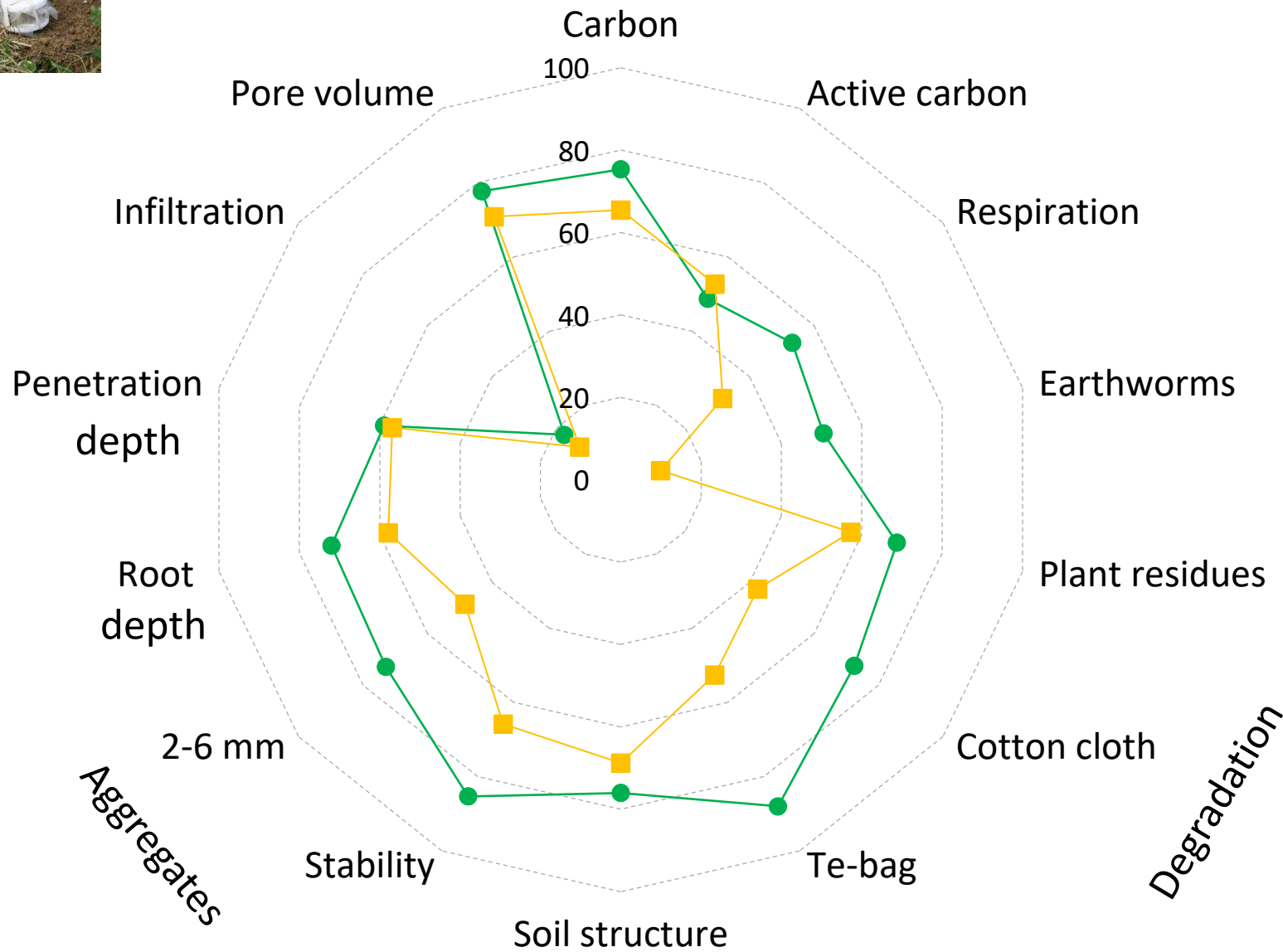
Arable farms





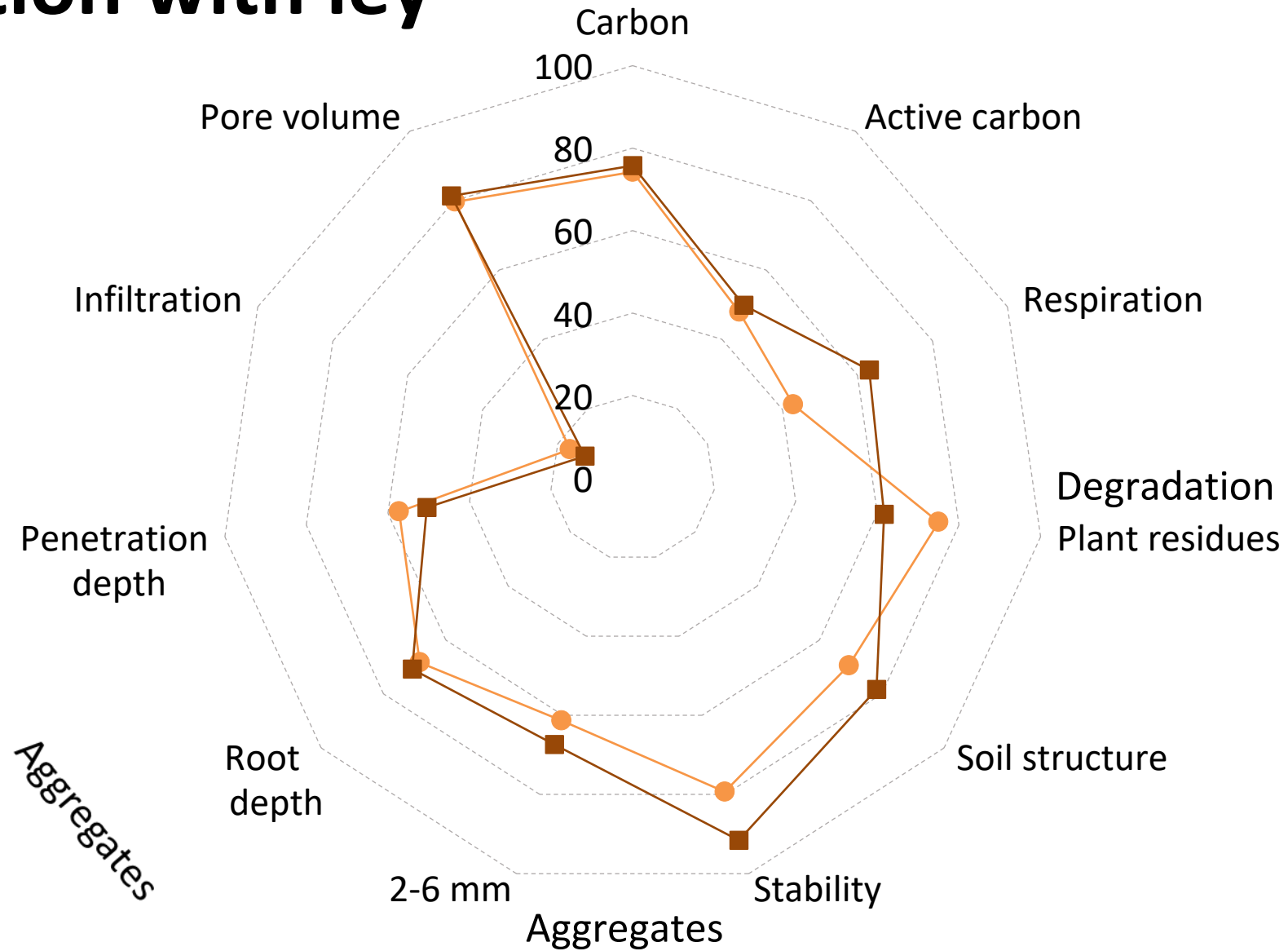


● Ley ■ Arable



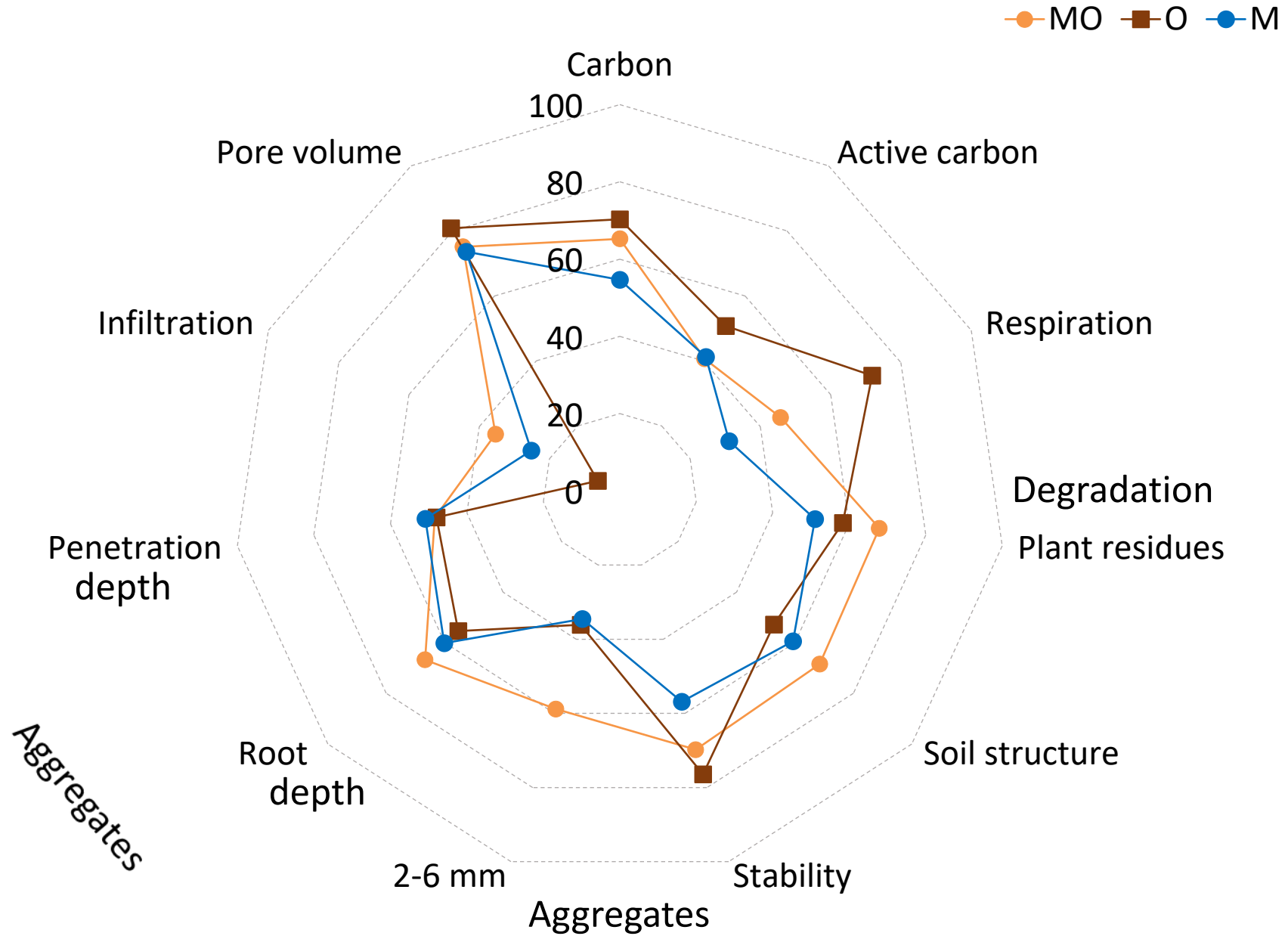
# Crop rotation with ley

—●— MO —■— O





# Arable



# Summary

- ✓ Spade is an easy and efficient tool to monitor soil health together with farmers.
- ✓ Crop rotations with grassland provide more living soil with greater stability against rain and drought.
- ✓ The plant roots are doing the job.
- ✓ Agriculture soils will benefit from catch crops, green manure and livestock manure.





# Capture project –

Assessment of cover cropping as climate action in cereal production in Norway

## <sup>13</sup>C labelling of the cover crop



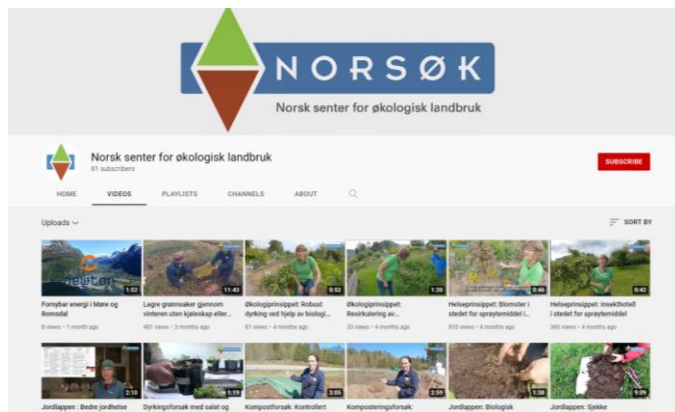
## N<sub>2</sub>O emissions





# Thank you!

## Questions ?



### More info:

<https://www.norsok.no/>

<https://www.youtube.com/channel/UCyq6x70FN83nIPP9518OoDg/videos>

<https://orgprints.org/id/eprint/43527/>



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