



NORØK

Norwegian Centre for Organic Agriculture

# Karbon i jord

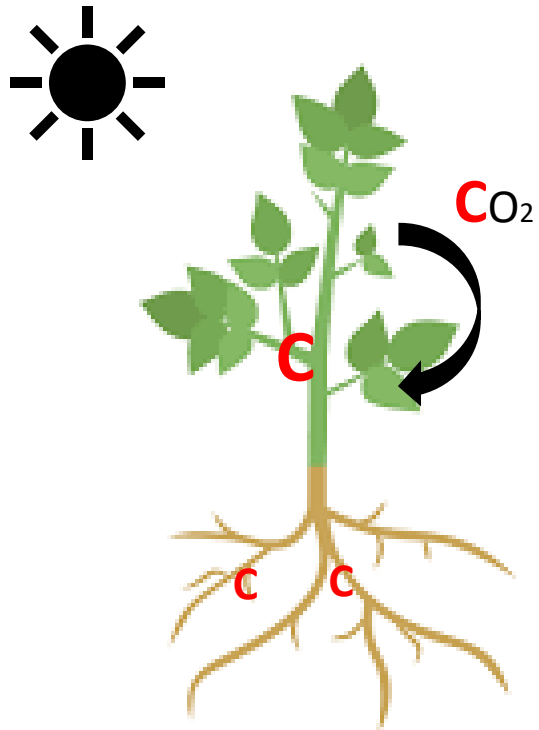
Tatiana Rittl & Reidun Pommeresche

Viken fylkeskommune velferdstur på Tingvoll gard

29.06.2023

# Carbon sequestration, storage and persistence

## Soil C sequestration

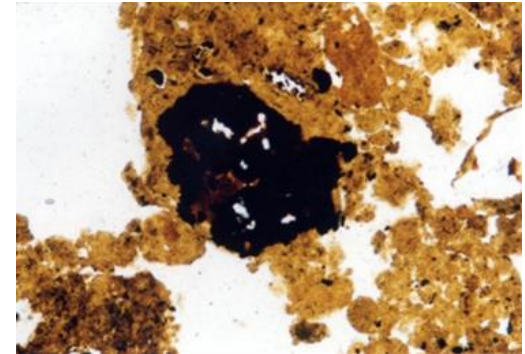


## Soil C storage



## Soil C persistence

(> 100 years)



Microaggregate

# Organisk materiale i jord (mold)



Mer



Karbon i jord

Mindre





# Karbondilemmaet

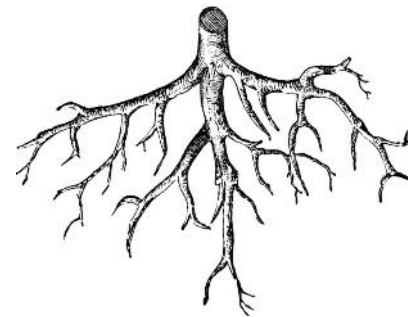
- Labilt karbon – sirkulerer rask (kort «liv» i jord)

## Forbedrer jordhelse

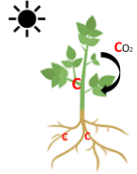


- Stabilt karbon – sirkulerer langsomt (langt «liv» i jord)

## Stort potensiale for karbonlagring



# Hva vi kan gjøre?



**Levende planter** (fangvekster, underkultur)



**Plantrest**



**Organisk materialer** (gjødsel, biokull, råtnerest)



Jorderosjon

# MerMold



Undersøke hvordan **ulike typer organisk materiale** og **fangvekster** påvirker jord og kommende års plantevekst og potetkvalitet





# MerMold : Ulike typer organisk materiale

Tilført organisk materiale i 2019

Fast råtnerest

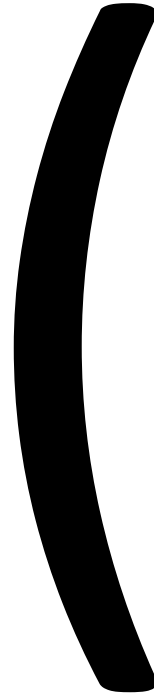


Hestegjødsel



Biokull fuktet med flytende råtnerest







# Biokull historie

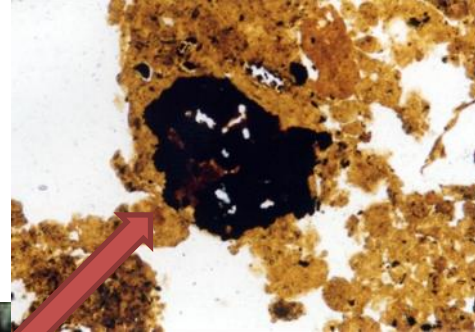
Amazon soils



Amazon Dark earth soils



Charcoal (biokull)



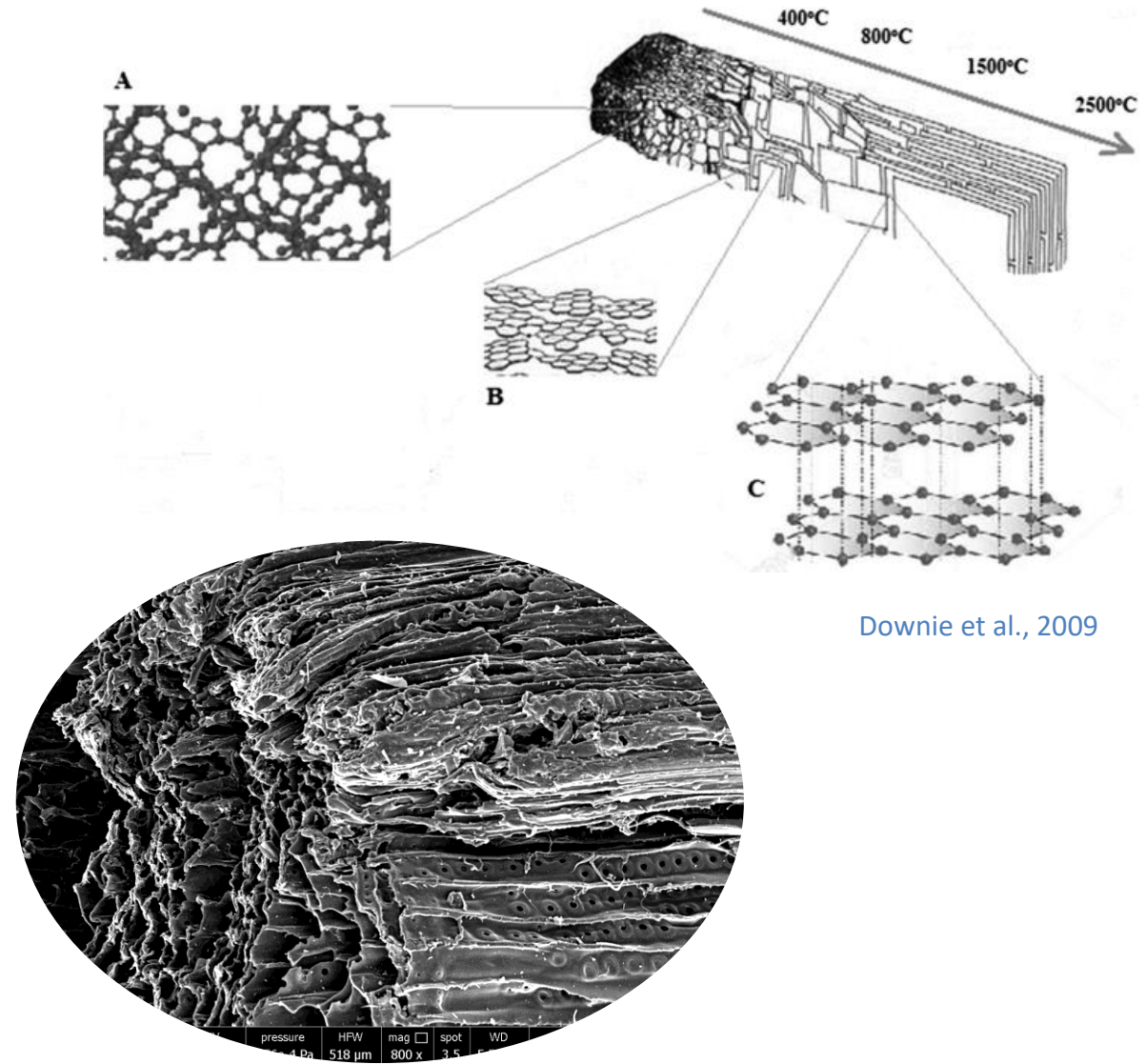
## Amazon Dark Earth jord/biokull lagring

- Temperaturen var lav;
- Forskjellige organisk materialer;
- Lenge tid prosess > 100;



Glaser & Birk, 2012

# Biokull i dag



Downie et al., 2009

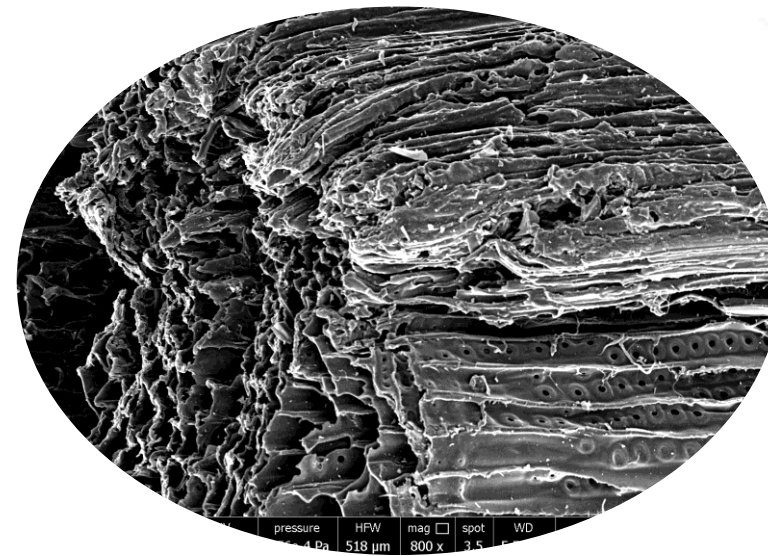
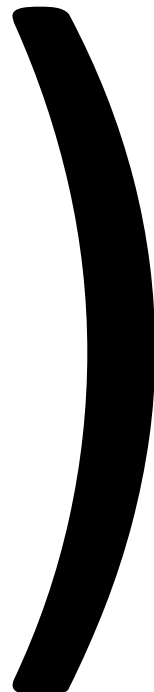


Photo: StandardBio





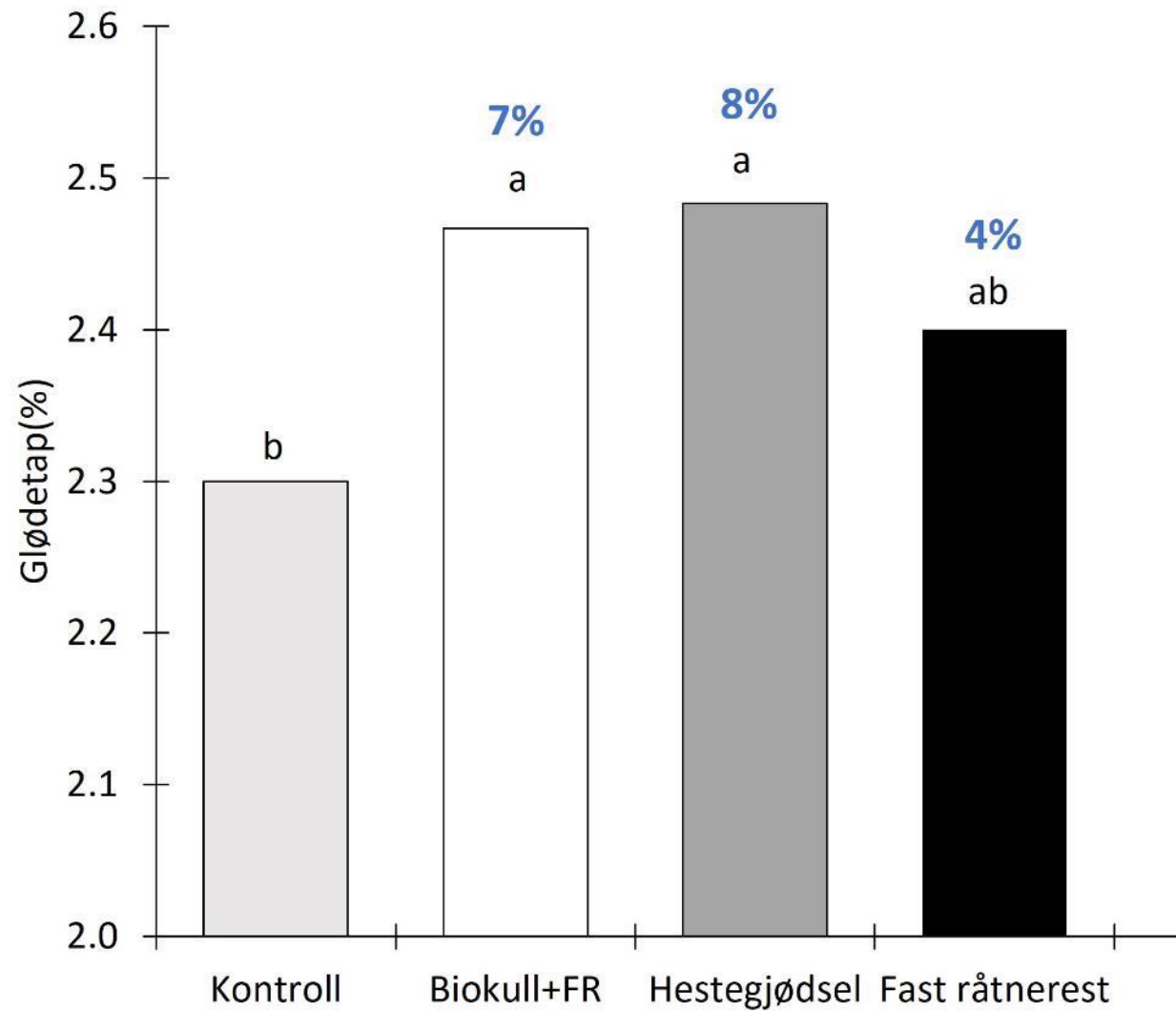
# 2019





# Moldinnhold i 2021

Feltforsøk



# Potensialet for karbonlagring

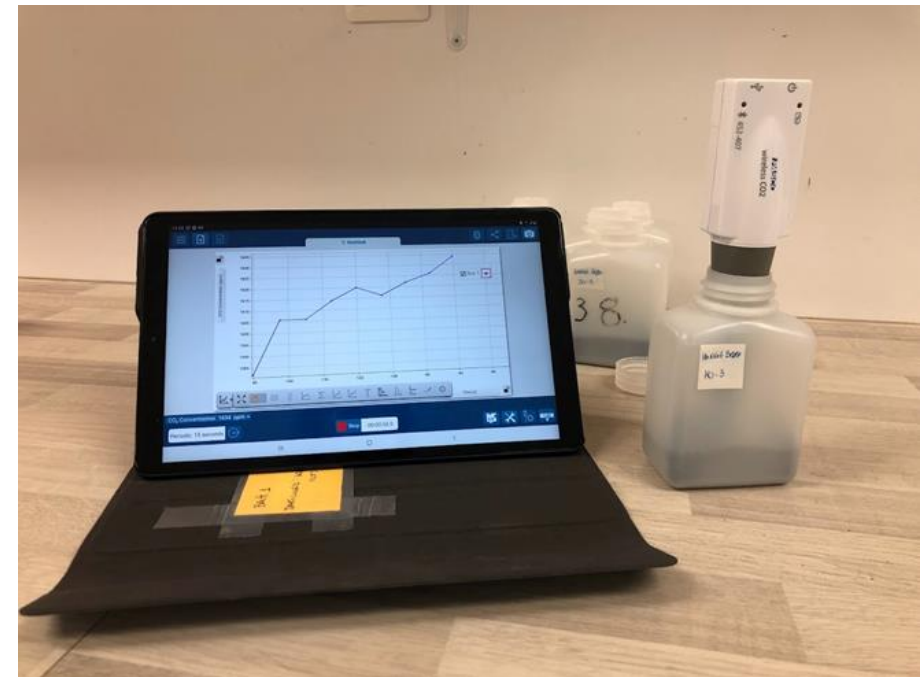
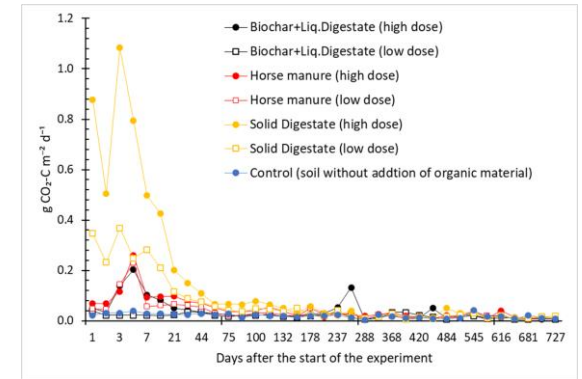
Laboratorieforsøket

Organisk materiale	Maksimum tid i jord (år)
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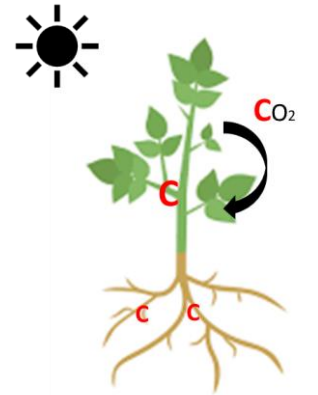
Biokull+FR	32
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Hestegjødsel	8
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Fast råtnerest	3
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# CAPTURE: fangvekster i korn produksjon



## Fangvekster til jordkarbon

*Summer vetch*



*I. Ryegrass*



*Phaselia*

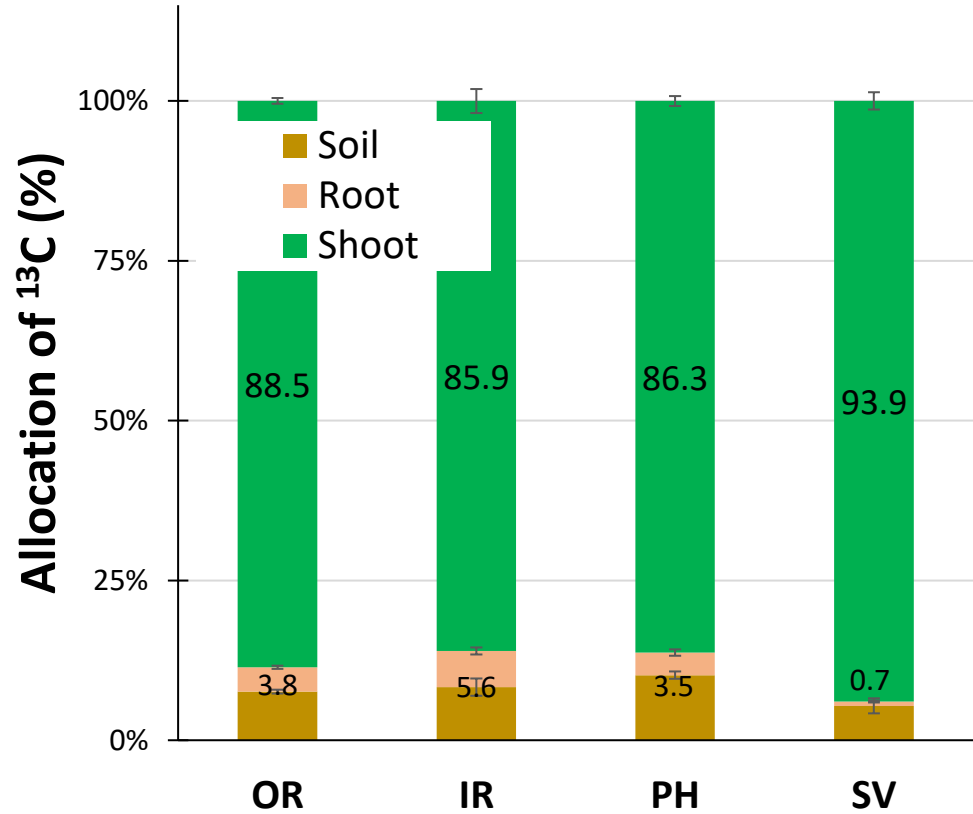
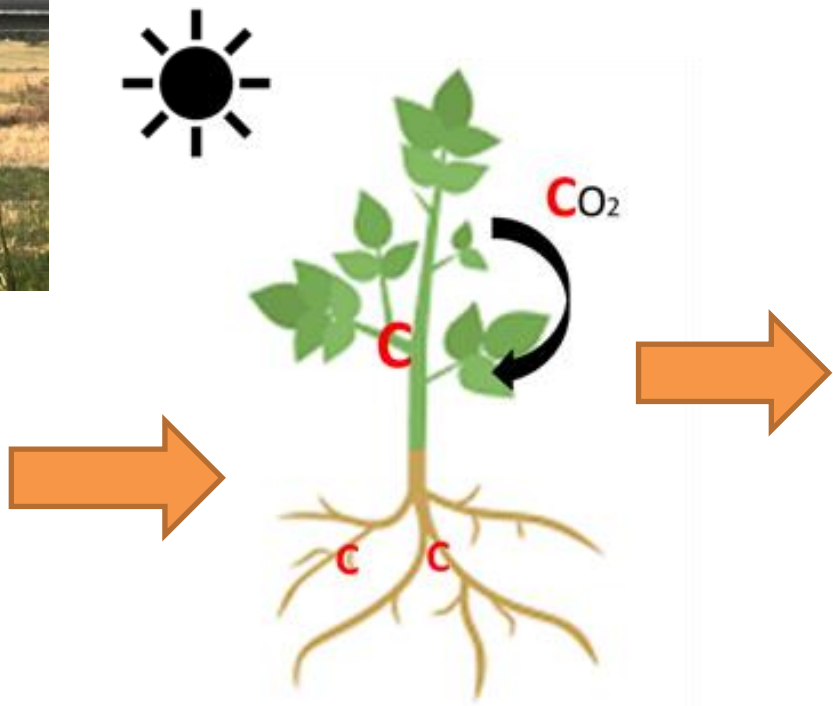


*O. radish*



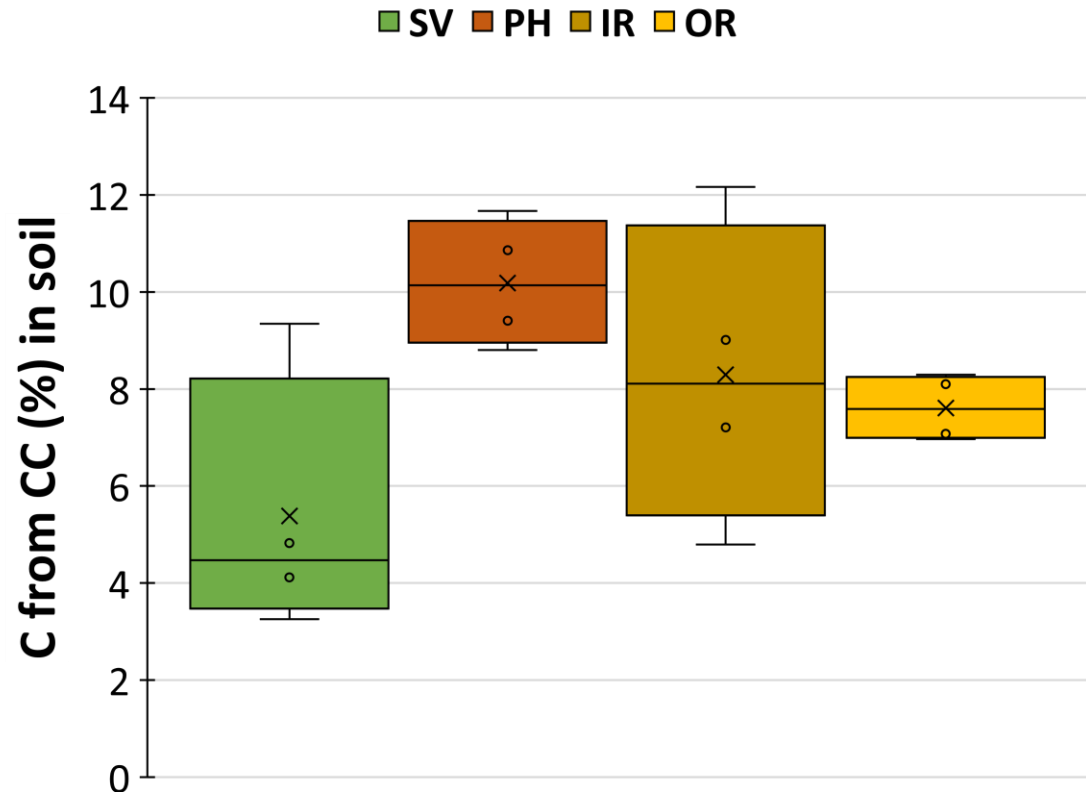


# CAPTURE: Fangvekster til jordkarbon



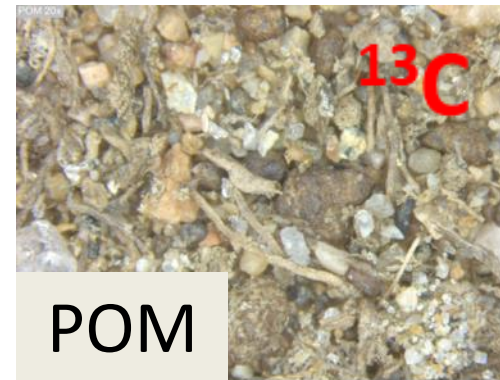


# CAPTURE: Persistence C in soil



## Jordfraksjoner

Jordhelse



C-lagring



- **POM: Particulate Organic Matter**
- **MAOM: Mineral-Associated Organic Matter**

# Tingvoll gard og SoilEffects: Lenge tid feltforsøk

Tingvoll gard (1990 - )

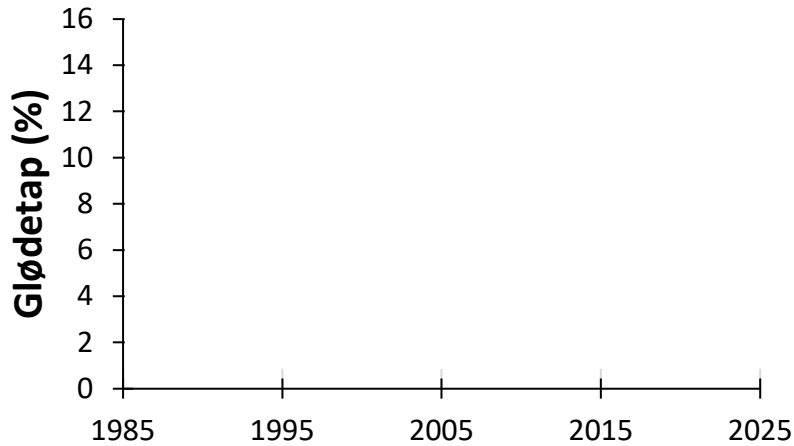


Soil effects feltforsøk (2011 - )



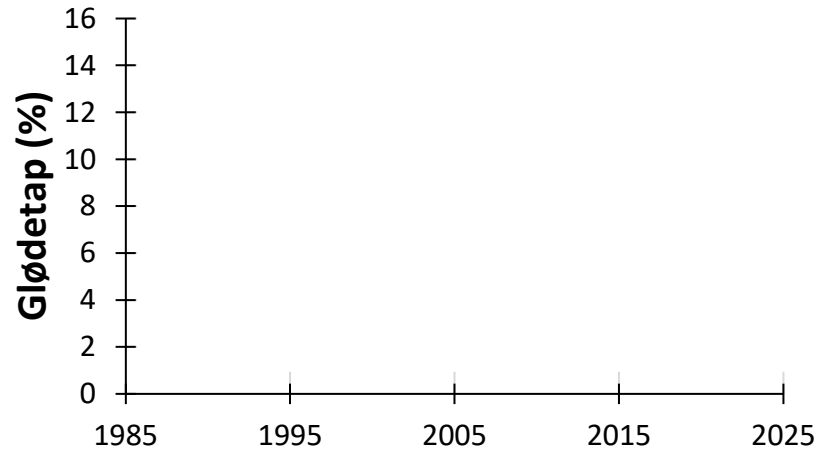
# Tingvoll gard – organisk melk gard

## Veldig Høy

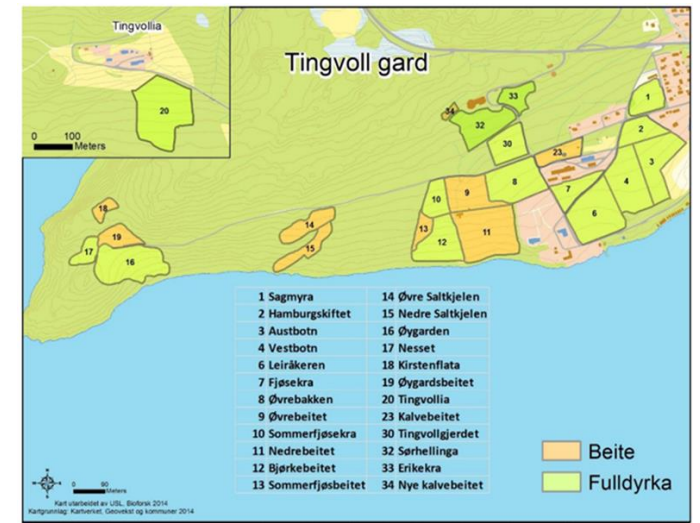
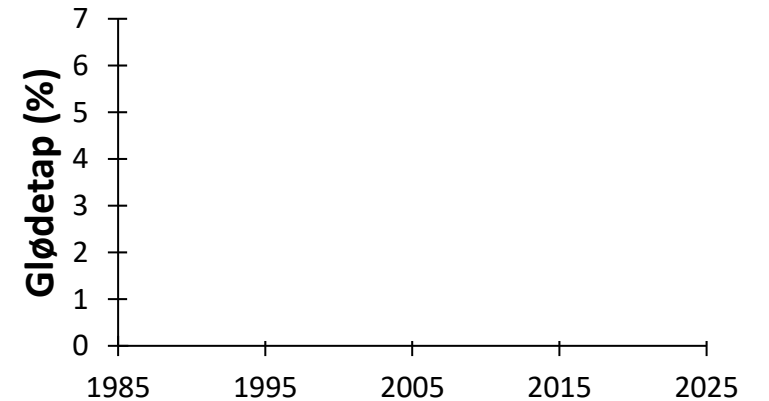


Veldig høy: GL >12%  
 Høy: 6 < GL < 12%  
 Lav: < 6%

## Høy



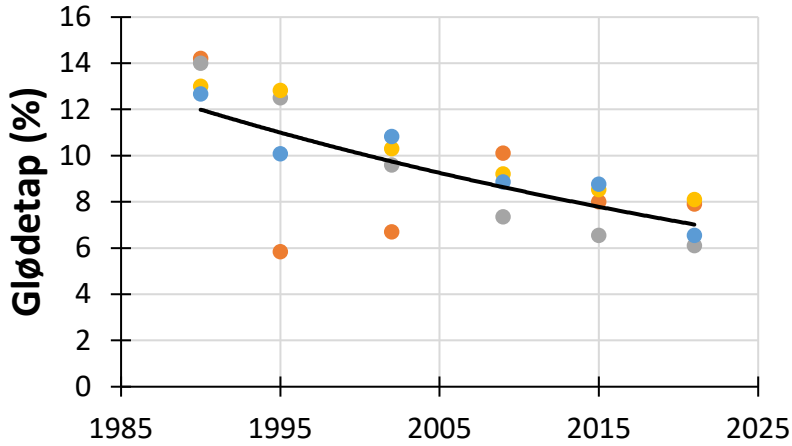
## Lav





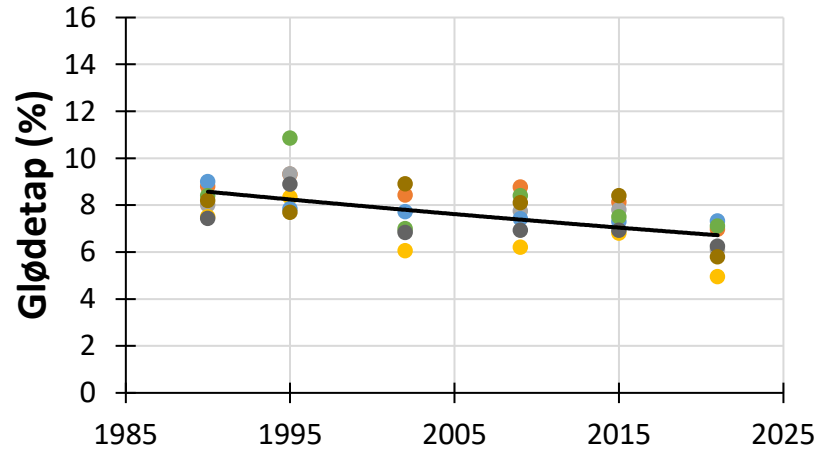
# Tingvoll gard – organisk melk gard

Veldig Høy

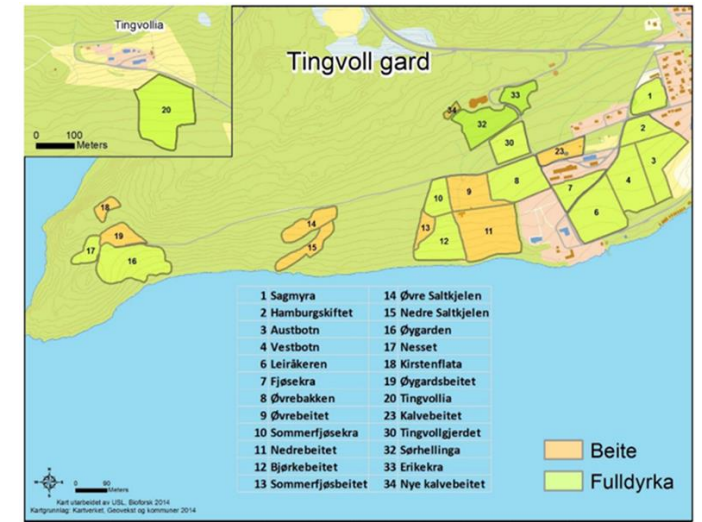
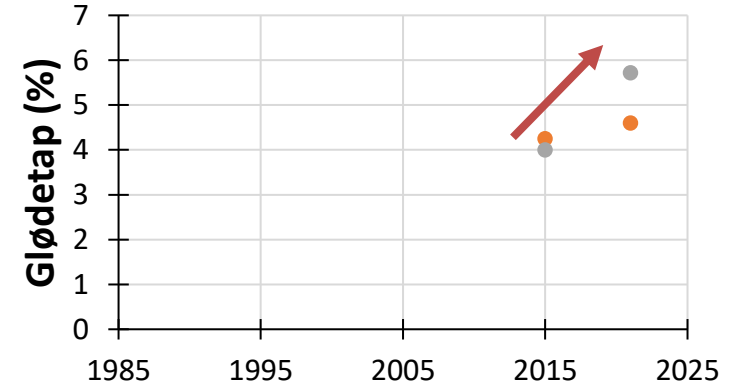


Veldig høy: SOM >12%  
 Høy: 6 < SOM < 12%  
 Lav: < 6%

Høy



Lav





# Soil effects felteksperiment



## Slurry type

Untreated Slurry  
(US)



Anaerobically  
Digested  
Slurry (ADS)



## Slurry rates

Lav (110 kg N ha<sup>-1</sup>)  
(Organic farm with small  
import of feed)

Høy (220 kg N ha<sup>-1</sup>)  
(«Conventional» farm;  
or organic with high  
import of feed)

## Treatments

USL

USH

ADSL

ADSH

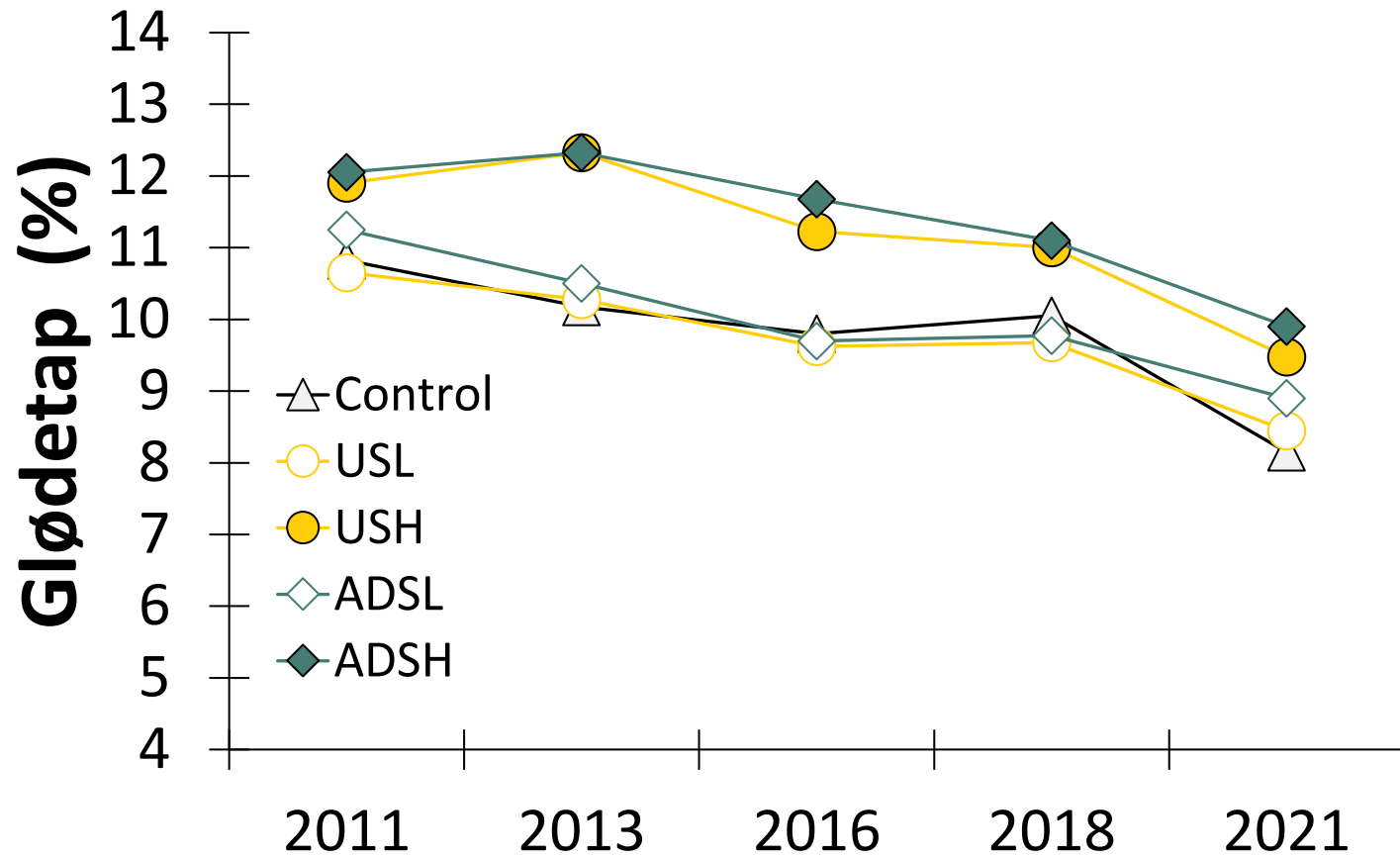
CONTROL  
(no manure)

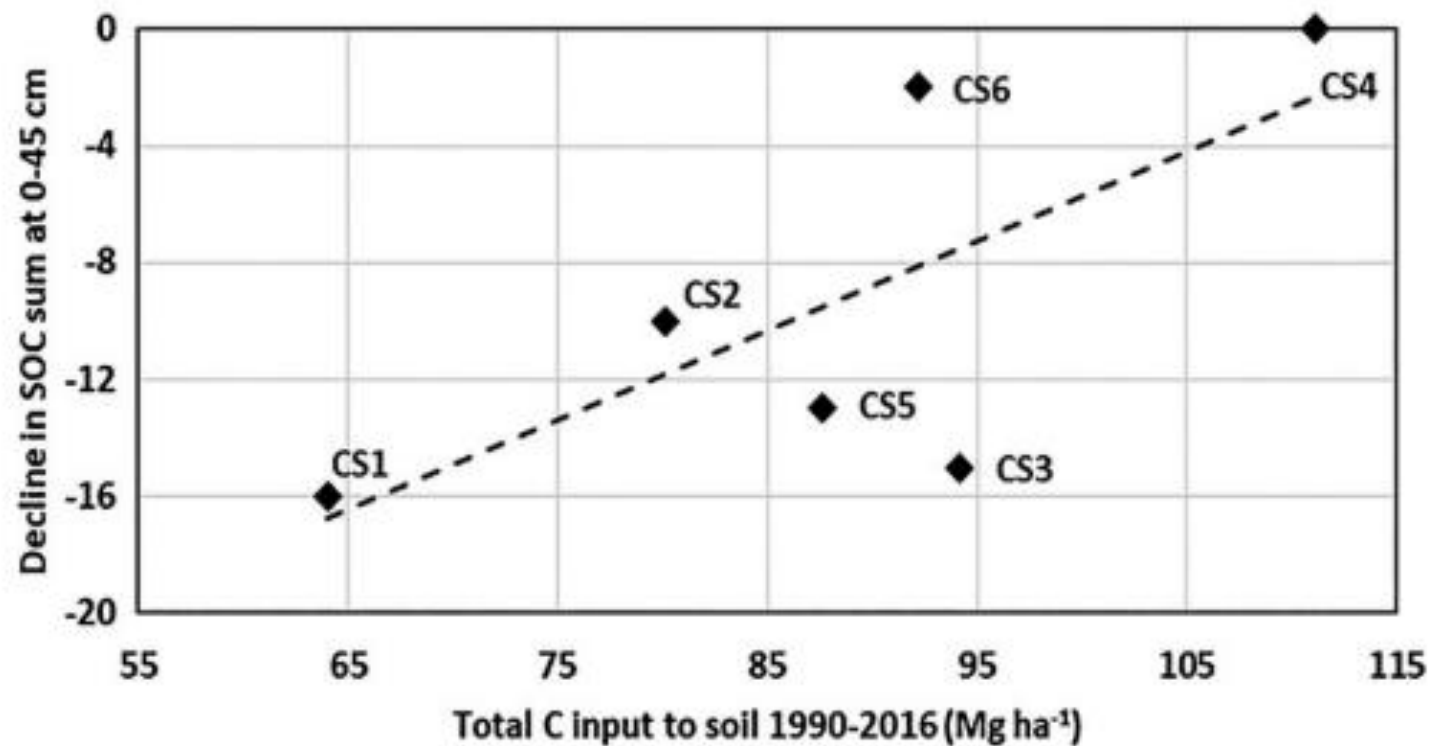


Long-term field experiment (2011-)



# Soil effects feltforsøk



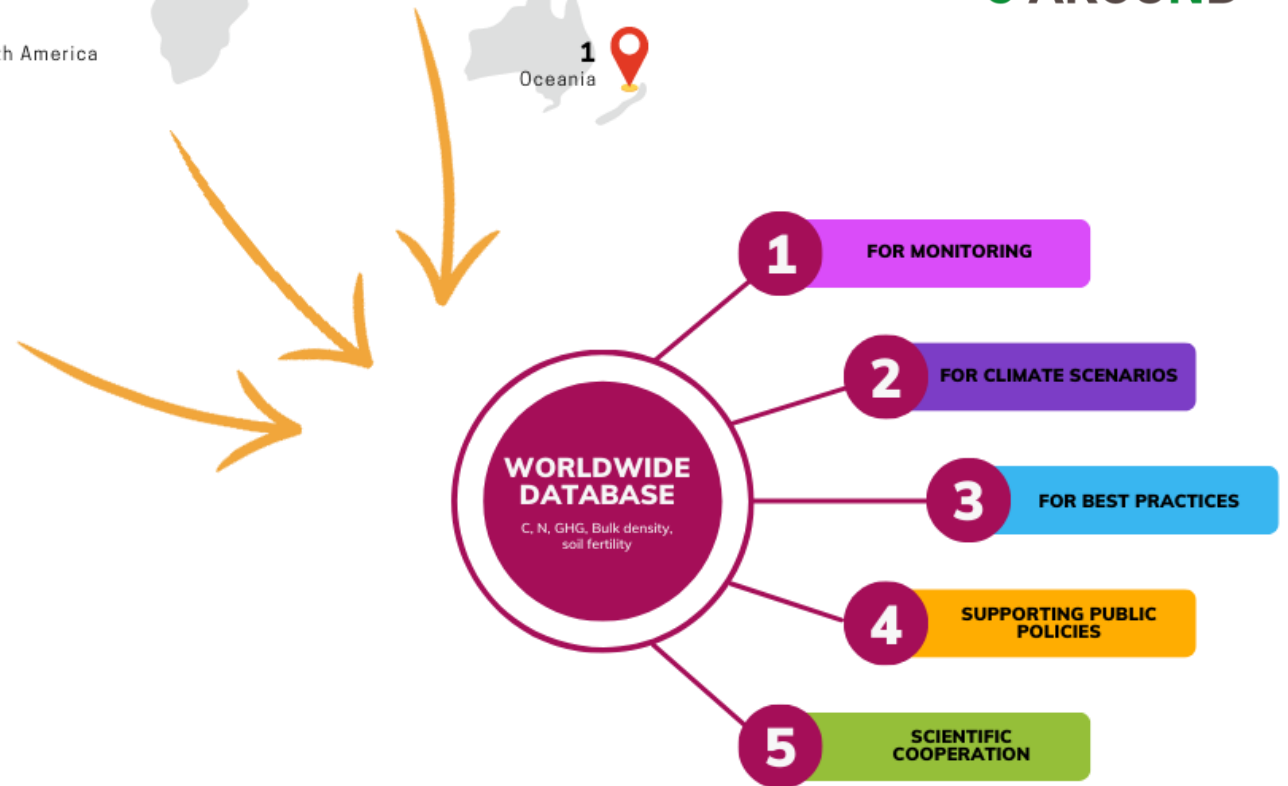


**Table 1.** Main management features of the six cropping systems (CS1–CS6).

System name	Crop rotation	Tillage (arable)	Slurry use	Mineral fertiliser	Straw removal	Catch crops	
CS1	Reference arable	Wheat, oats, barley, potato	Autumn plough	None	Yes NPK	Yes	No
CS2	Optimised arable	Wheat, oats, barley, potato	Spring harrow	None	Yes NPK	No	Yes
CS3	Organic arable	Wheat, oats/pea, barley, ley	Spring plough	Some	None	No	Yes
CS4	Optimised dairy	Wheat, barley, ley, ley	Spring plough	Annual	Yes NPK	No	Yes
CS5	Organic dairy (50%)	Wheat, barley, ley, ley	Spring plough	Annual	None	No	Yes
CS6	Organic dairy (75%)	Barley, ley, ley, ley	Spring plough	Annual	None	No	Yes

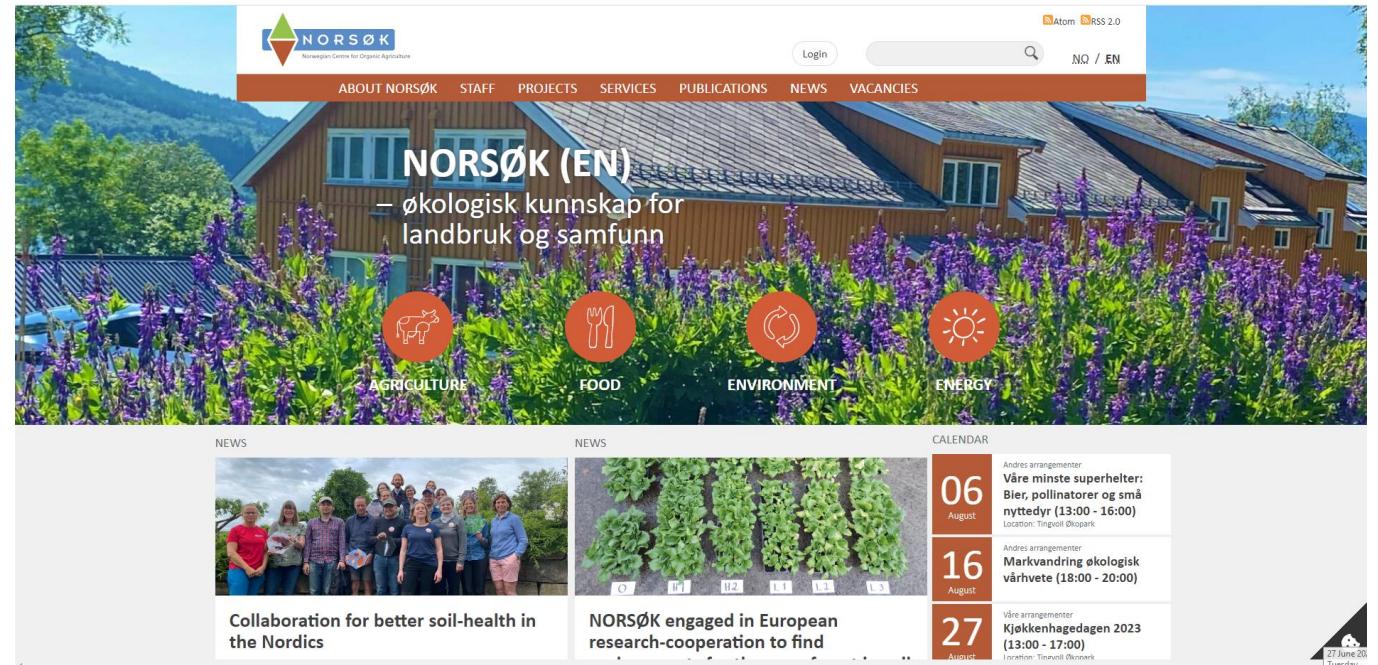
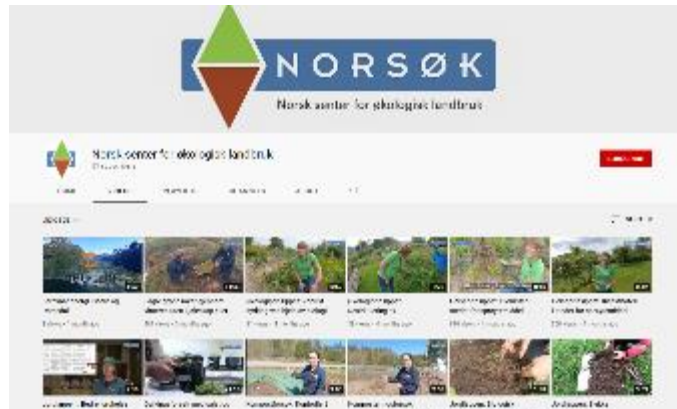
# C-arouND

## C-arouNd





# For mer info:



## Mer info:

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

<https://www.youtube.com/channel/UCyq6x7OFN83nlPP9518OoDg/videos>

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