



NORØK

Norwegian Centre for Organic Agriculture

Karbon i jord

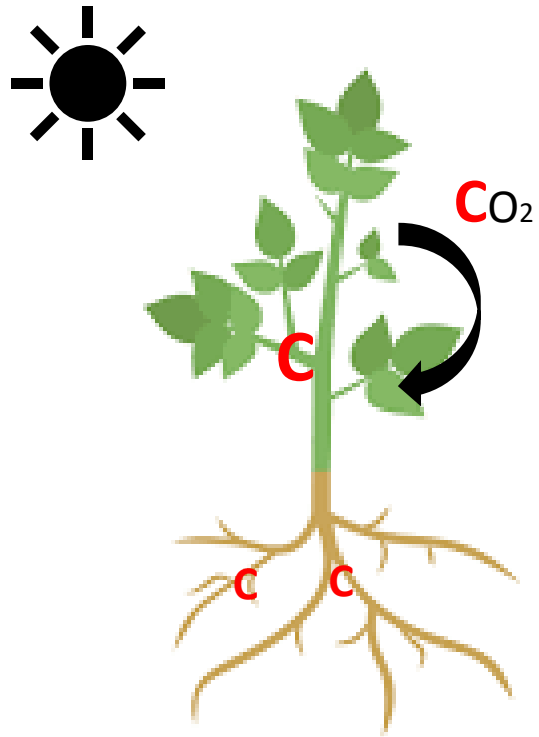
Tatiana Rittl & Reidun Pommeresche

Viken fylkeskommune velferdstur på Tingvoll gard

29.06.2023

Carbon sequestration, storage and persistence

Soil C sequestration

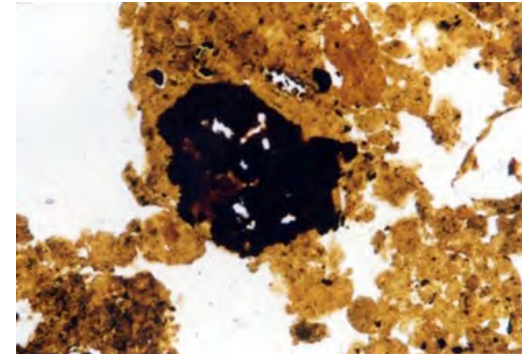


Soil C storage



Soil C persistence

(> 100 years)



Organisk materiale i jord (mold)



Mer



Karbon i jord

Mindre



Karbondilemmaet

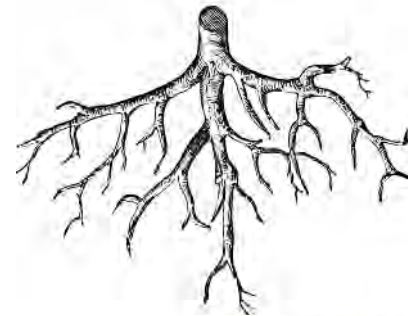
- Labilt karbon – sirkulerer rask (kort «liv» i jord)

Forbedrer jordhelse

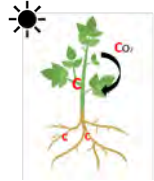


- Stabilt karbon – sirkulerer langsomt (langt «liv» i jord)

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

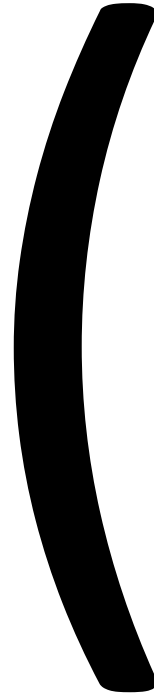


Hestegjødsel



Biokull fuktet med flytende råtnerest





Biokull historie

Amazon soils

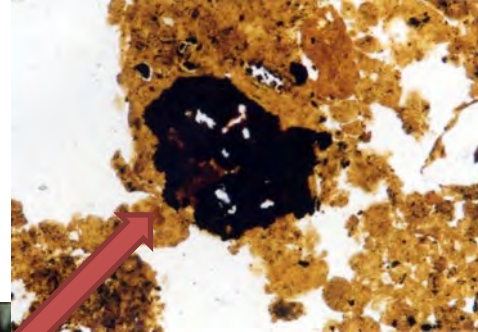


Amazon Dark earth soils



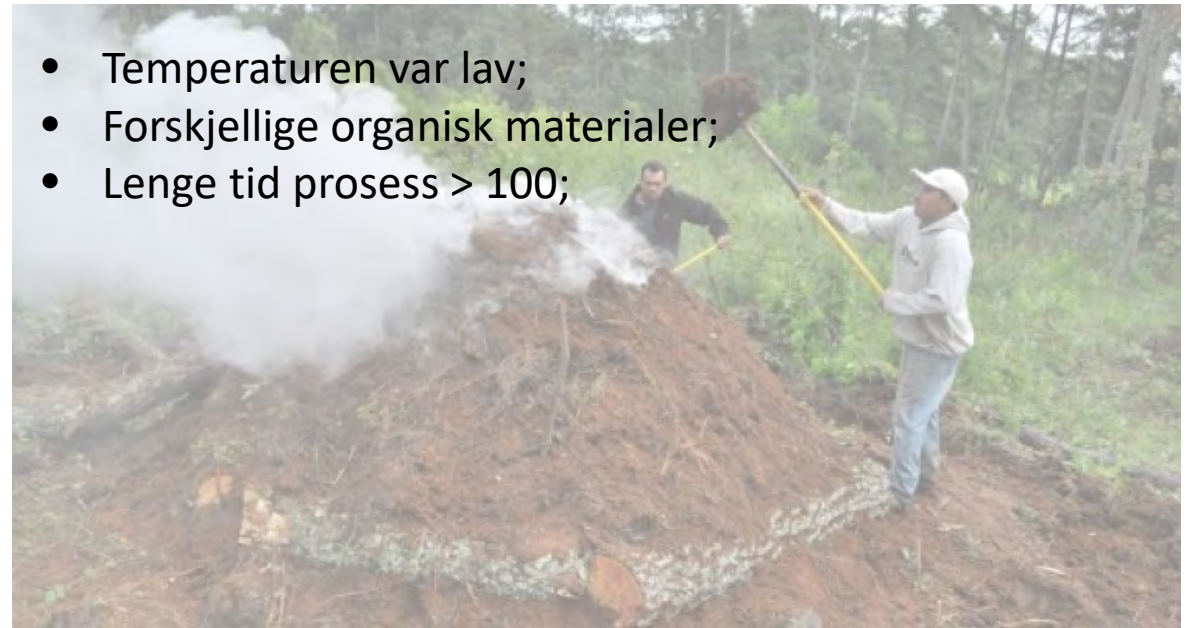
Glaser & Birk, 2012

Charcoal (biokull)

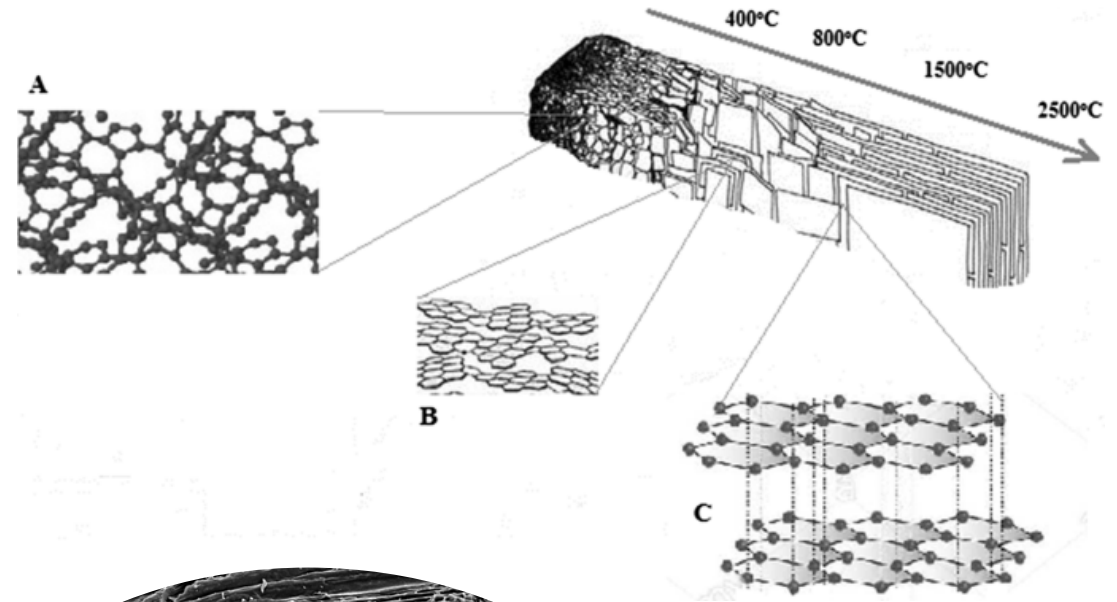


Amazon Dark Earth jord/biokull lagring

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



Biokull i dag



Downie et al., 2009

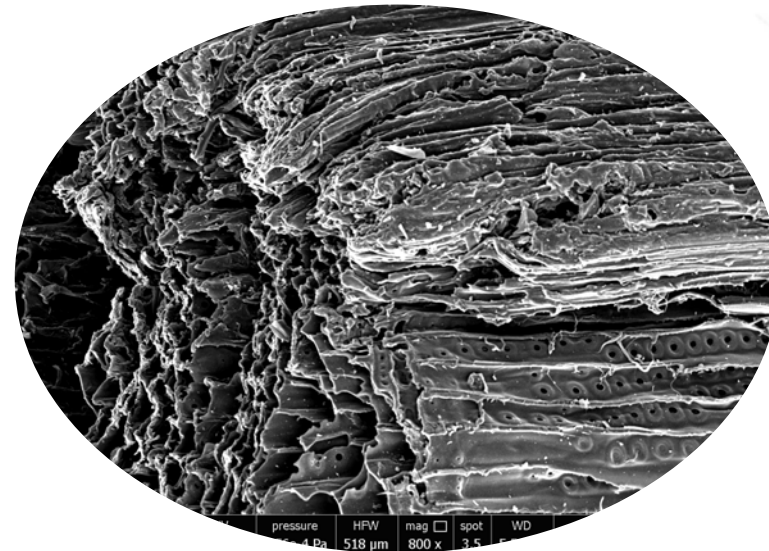


Photo: StandardBio

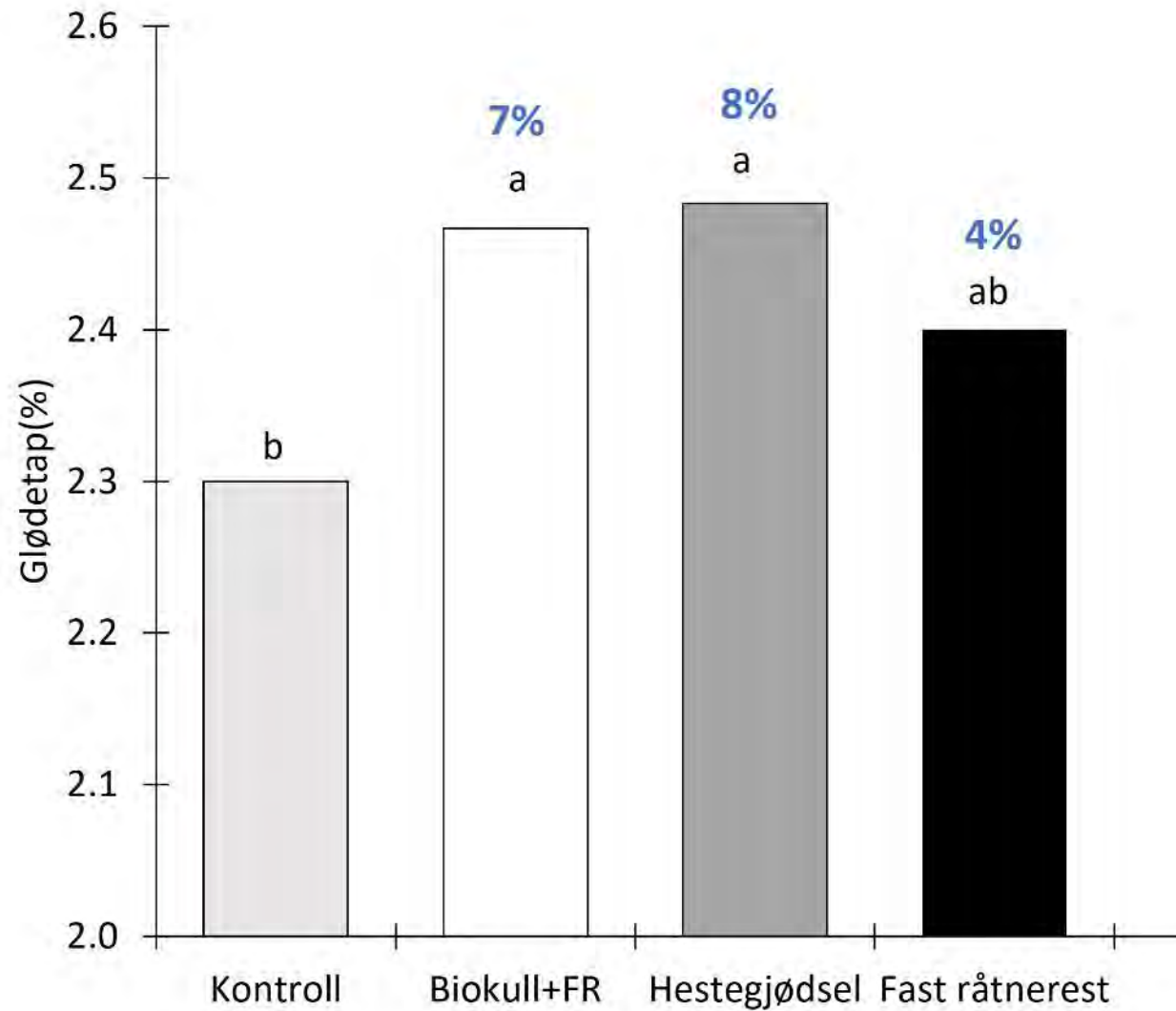


2019



Moldinnhold i 2021

Feltforsøk



Potensialet for karbonlagring

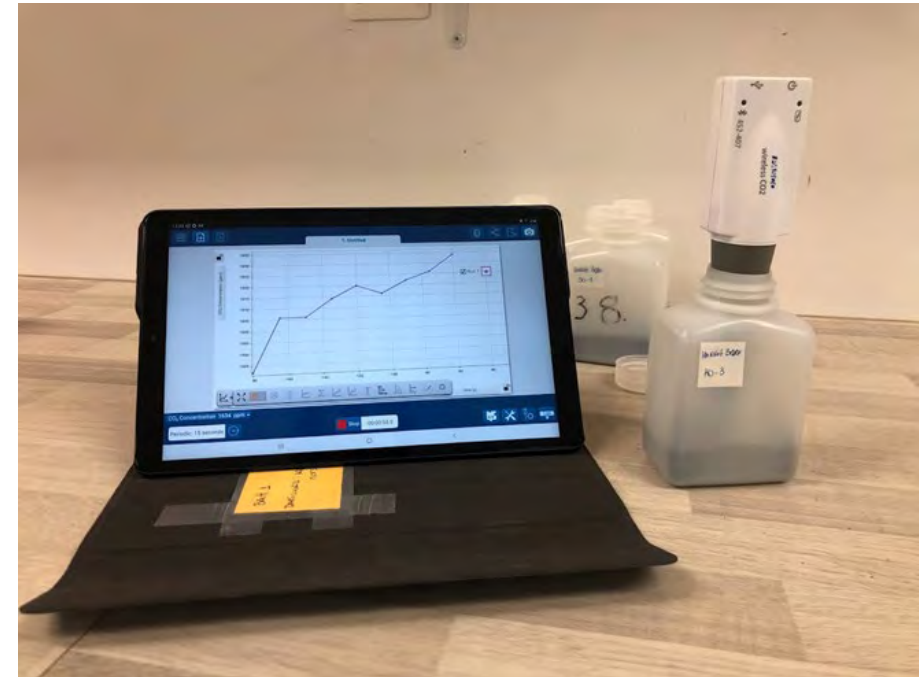
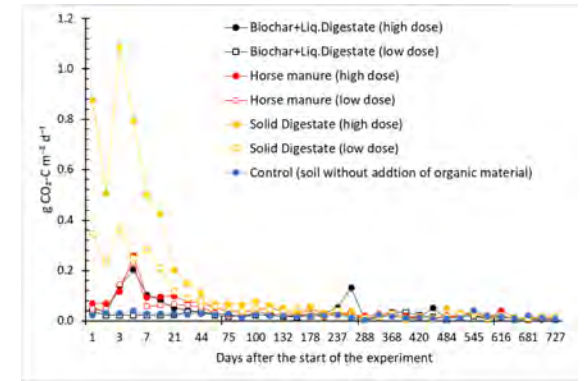
Laboratorieforsøket

Organisk materiale	Maksimum tid i jord (år)
--------------------	--------------------------

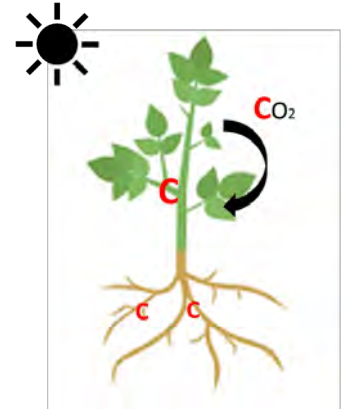
Biokull+FR	32
------------	----

Hestegjødsel	8
--------------	---

Fast råtnerest	3
----------------	---



CAPTURE: fangvekster i korn produksjon



Fangvekster til jordkarbon

Summer vetch



I. Ryegrass



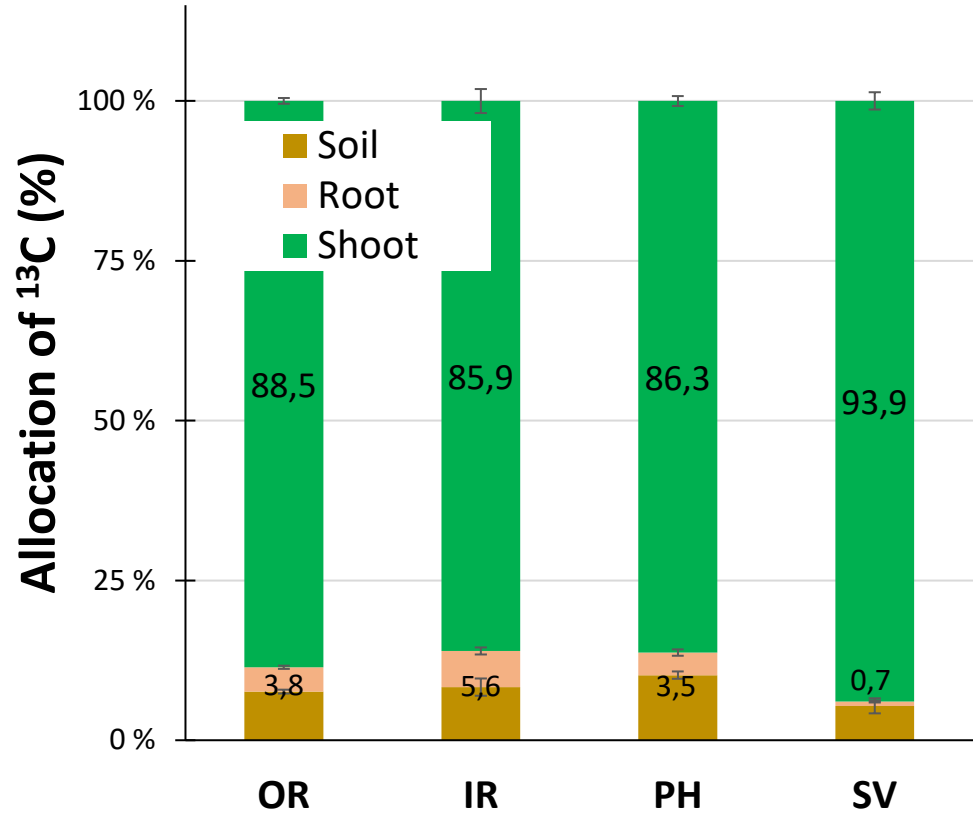
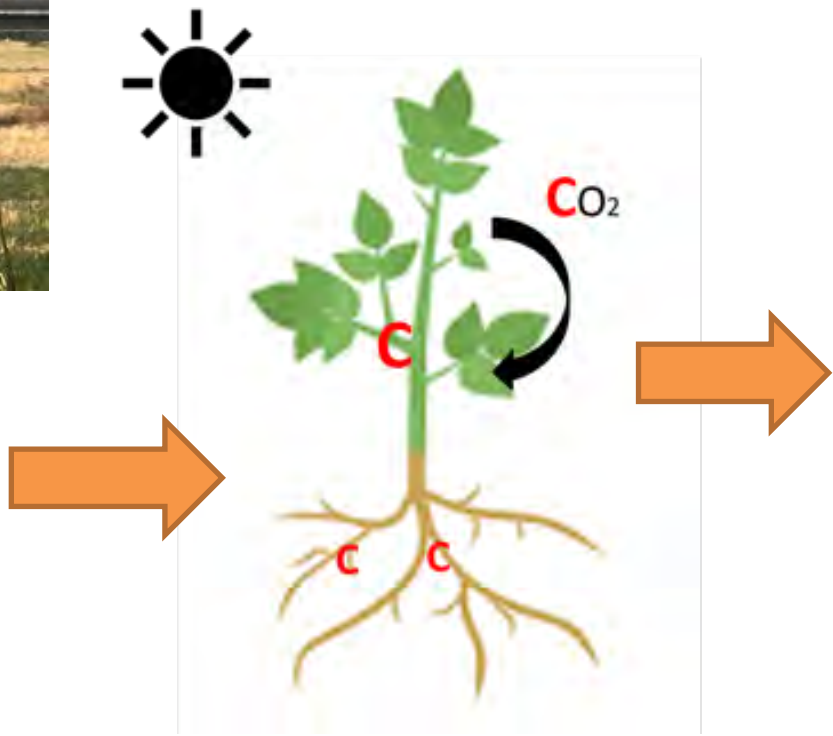
Phaselia



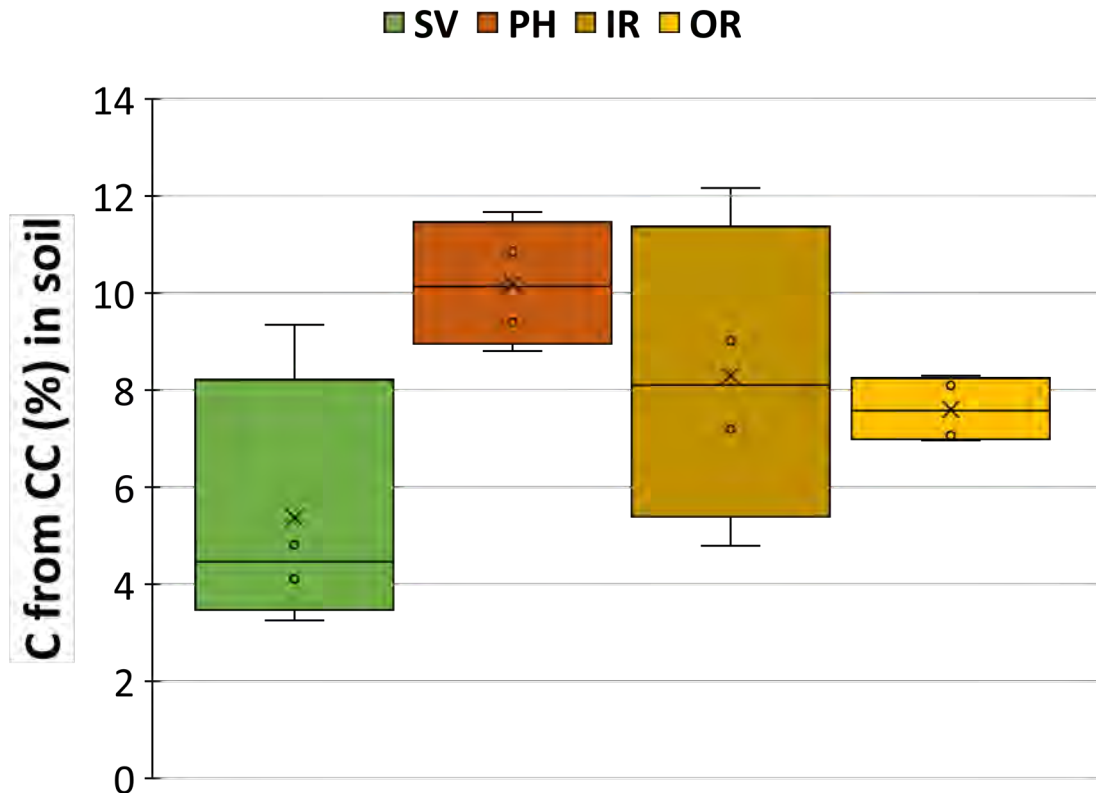
O. radish



CAPTURE: Fangvekster til jordkarbon

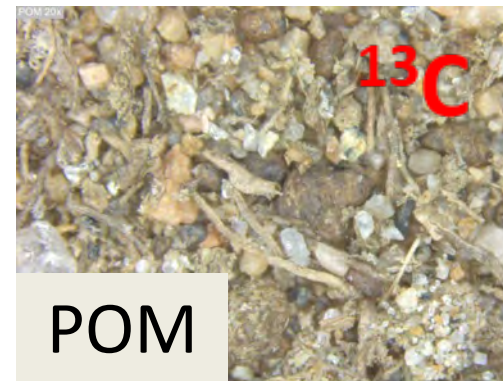


CAPTURE: Persistence C in soil

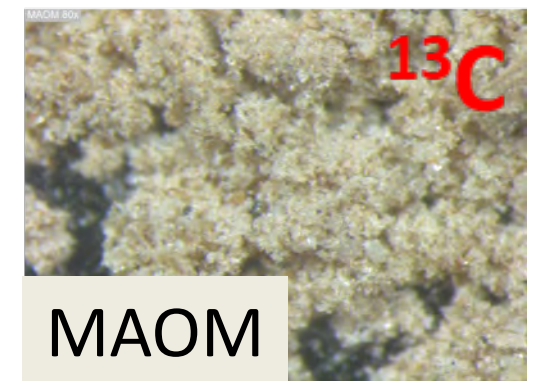


Jordfraksjoner

Jordhelse



C-lagring



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

Tingvoll gard og SoilEffects: Lenge tid feltforsøk

Tingvoll gard (1990 -)

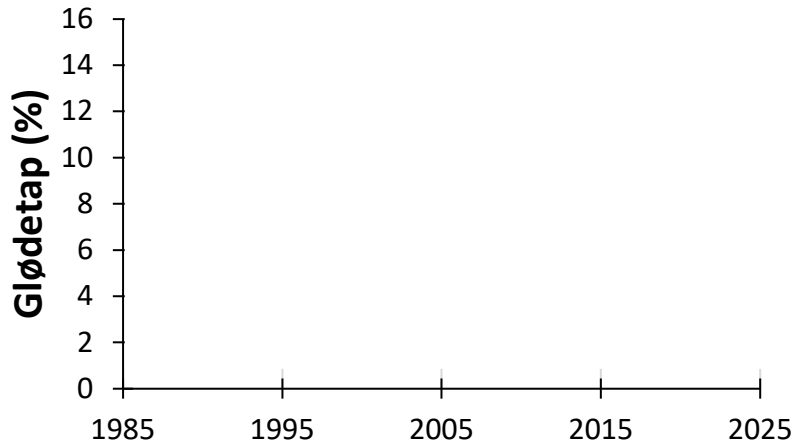


Soil effects feltforsøk (2011 -)



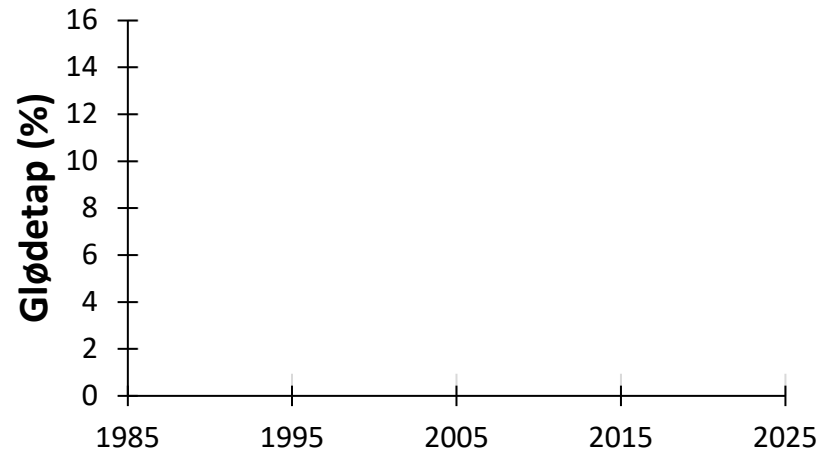
Tingvoll gard – organisk melk gard

Veldig Høy

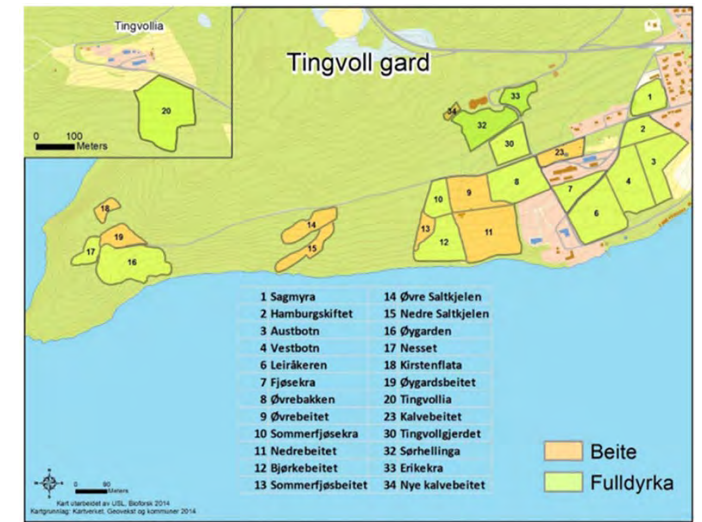
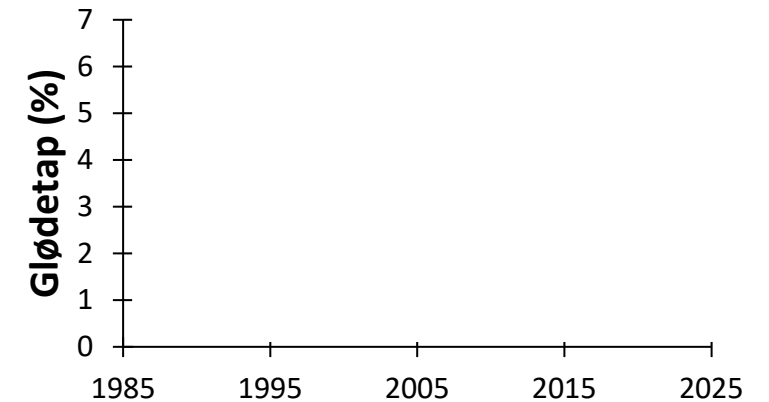


Veldig høy: GL >12%
Høy: 6 < GL < 12%
Lav: < 6%

Høy

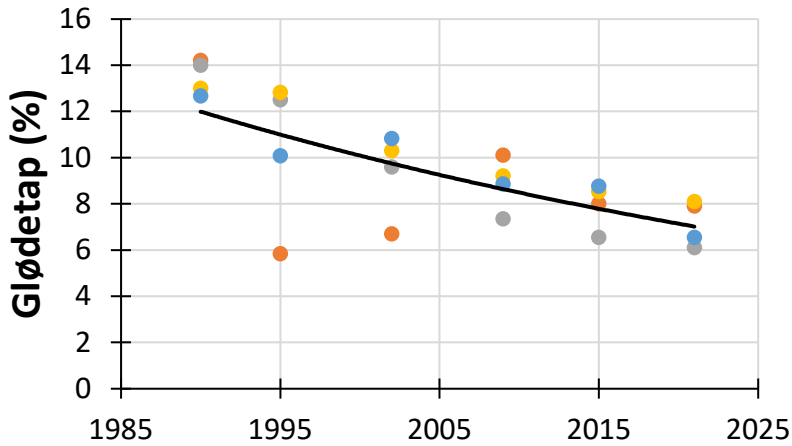


Lav



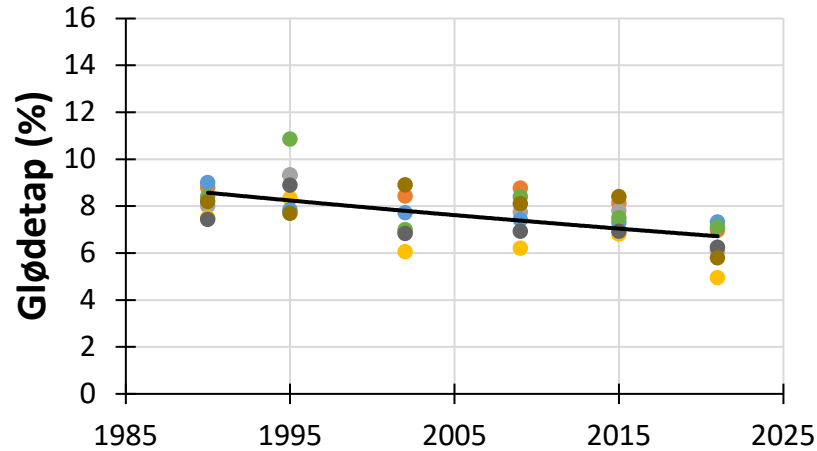
Tingvoll gard – organisk melk gard

Veldig Høy

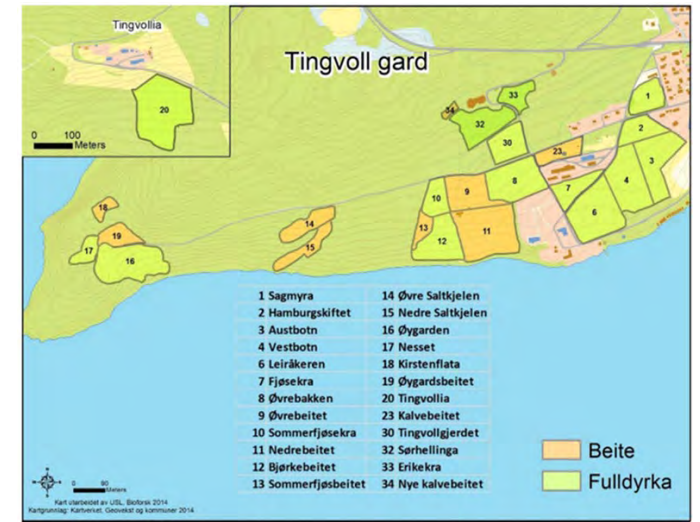
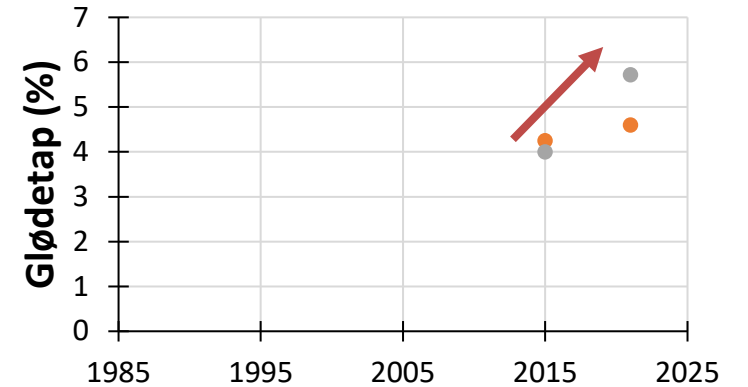


Veldig høy: SOM >12%
 Høy: 6 < SOM < 12%
 Lav: < 6%

Høy



Lav



Soil effects felteksperiment



Slurry type

Untreated Slurry
(US)



Anaerobically
Digested
Slurry (ADS)



Slurry rates

Lav (110 kg N ha⁻¹)

(Organic farm with small
import of feed)

Høy (220 kg N ha⁻¹)

(«Conventional» farm;
or organic with high
import of feed)

Treatments

USL

USH

ADSL

ADSH

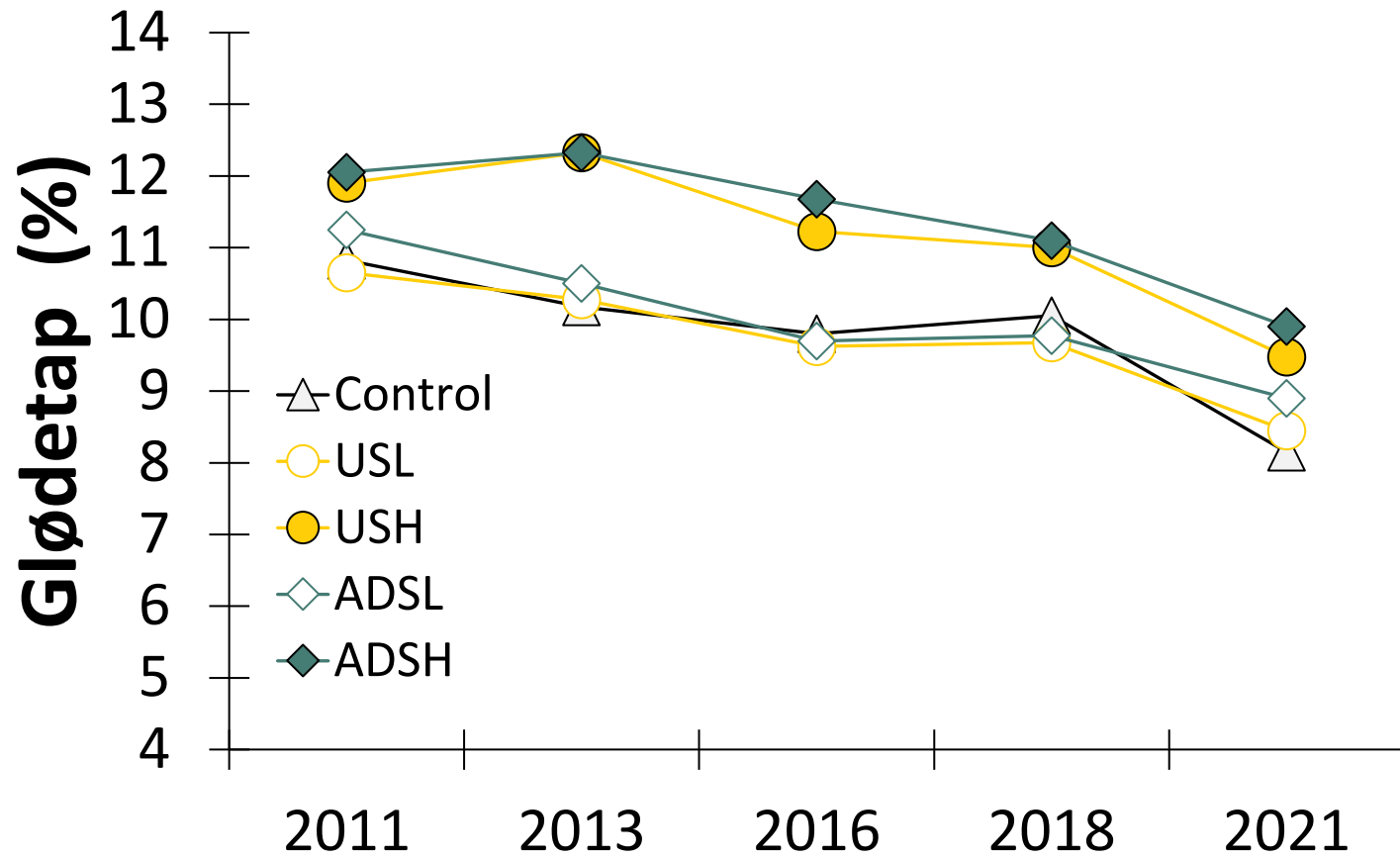
CONTROL
(no manure)



Long-term field experiment (2011-)



Soil effects feltforsøk



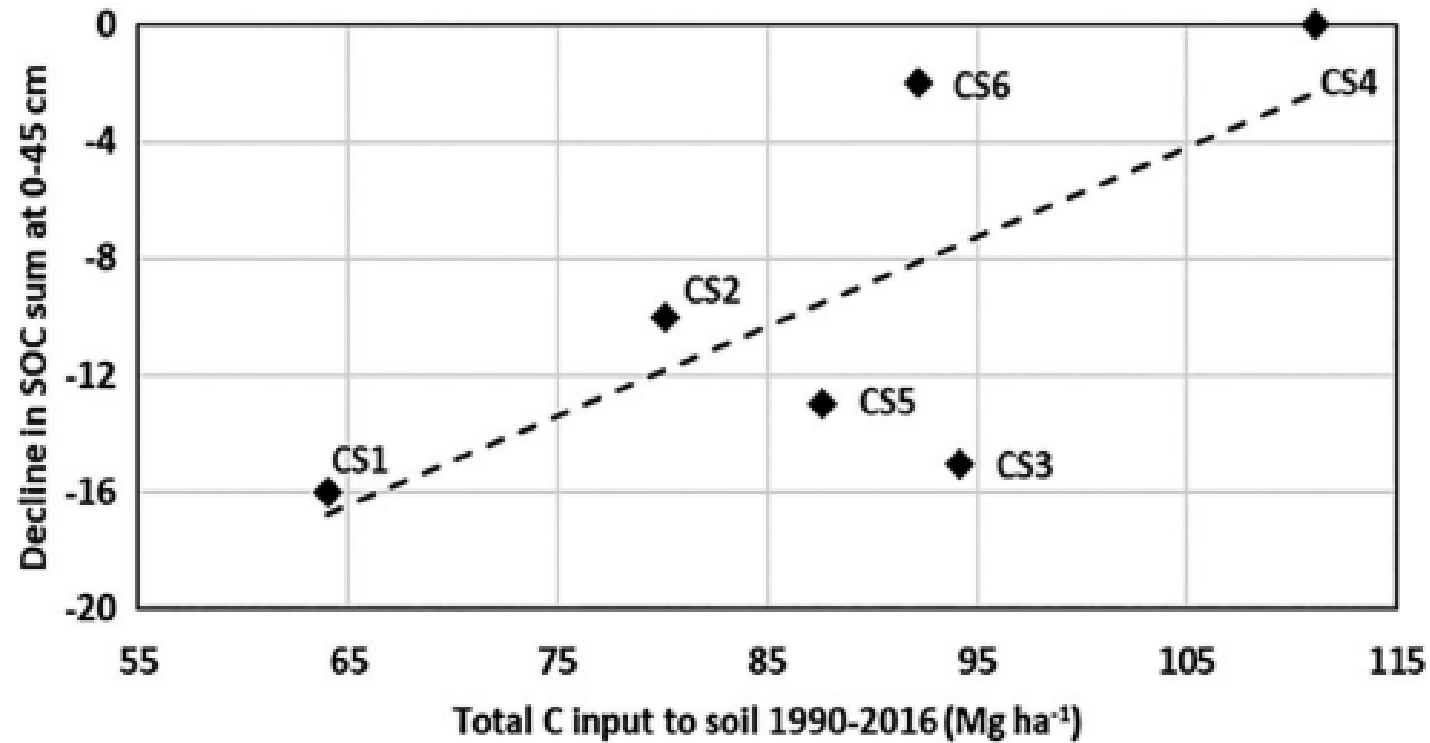


Table 1. Main management features of the six cropping systems (CS1–CS6).

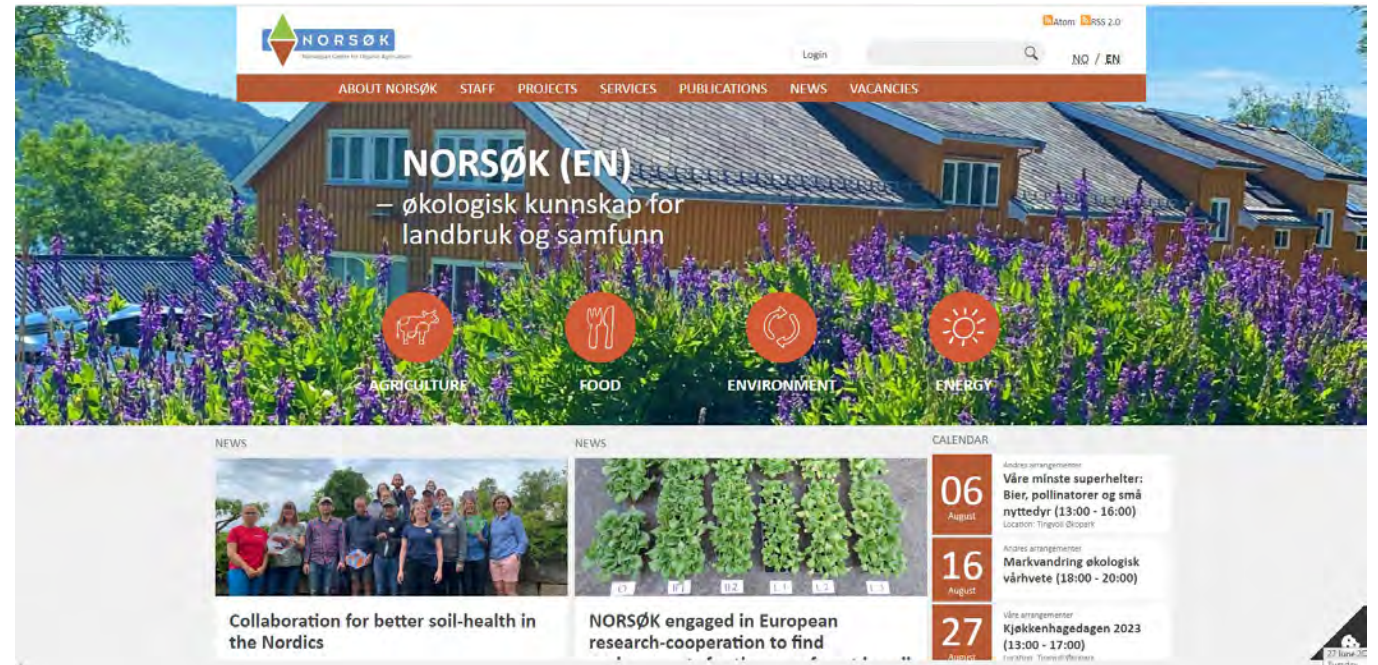
System name	Crop rotation	Tillage (arable)	Slurry use	Mineral fertiliser	Straw removal	Catch crops	
CS1	Reference arable	Wheat, oats, barley, potato	Autumn plough	None	Yes NPK	Yes	No
CS2	Optimised arable	Wheat, oats, barley, potato	Spring harrow	None	Yes NPK	No	Yes
CS3	Organic arable	Wheat, oats/pea, 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/UCyq6x7OFN83nIP9518OoDg/videos>

Tatiana F. Rittl
tatiana.rittl@norsok.no