

Norwegian Centre for Organic Agriculture

# Karboninnhold i jord, hva kan vi?

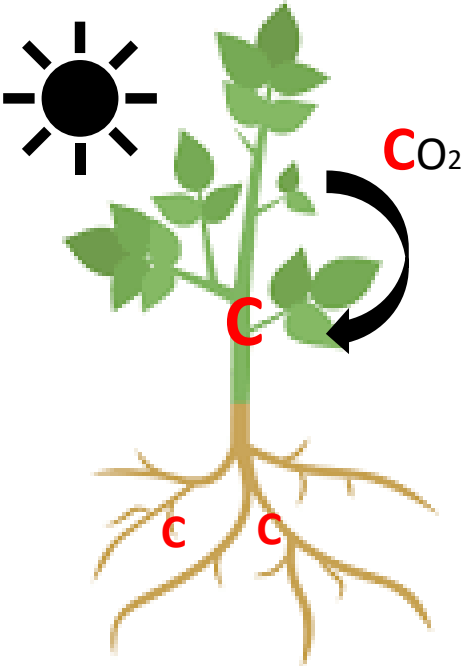
Tatiana Rittl, mange mange mange andre

Karbon i jord  
Seminar 17. og 18. oktober 2023  
Skjetlein og Øya videregående skoler

# Karbonbinding, karboninnhold, motstandskraft mot nedbryting

## Karbonbinding

Soil C sequestration



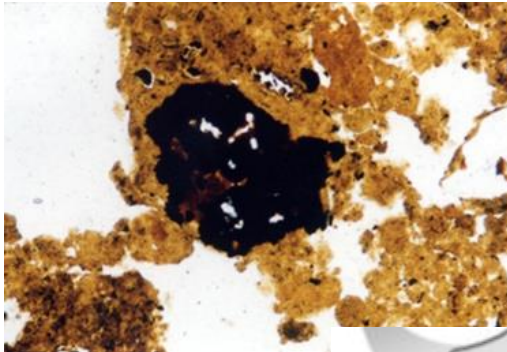
## Karboninnhold

Soil C storage



## Motstandskraft mot nedbryting

Soil C persistence



Microaggregate

# Organisk materiale i jord (mold)



Mer



Karbon i jord

Mindre



# Karbondilemmaet

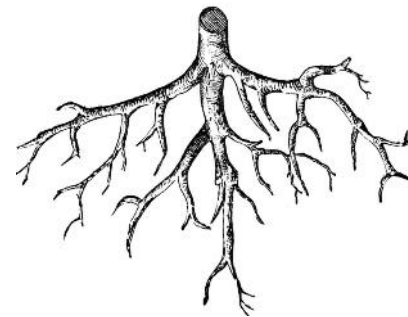
- Labilt karbon – sirkulerer rask (kort «liv» i jord)

## Forbedrer jordhelse

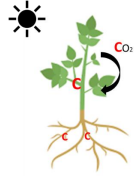


- Stabilt karbon – sirkulerer langsomt (langt «liv» i jord)

## Stort potensiale for karbonlagring



# Hva kan vi gjøre?



**Levende planter** (fangvekster, underkultur)



**Plantrest**



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



Jorderosjon

# Hva har vi gjort?

- Mermold
- Capture
- K-BEP
- SoilEffects



# MerMold



Undersøke hvordan **ulike typer organisk materiale** påvirker karbonlagring i jord



# MerMold : Ulike typer organisk materiale

Tilført organisk materiale i 2019

Fast råtnerest



Hestegjødsel



Biokull fuktet med flytende råtnerest



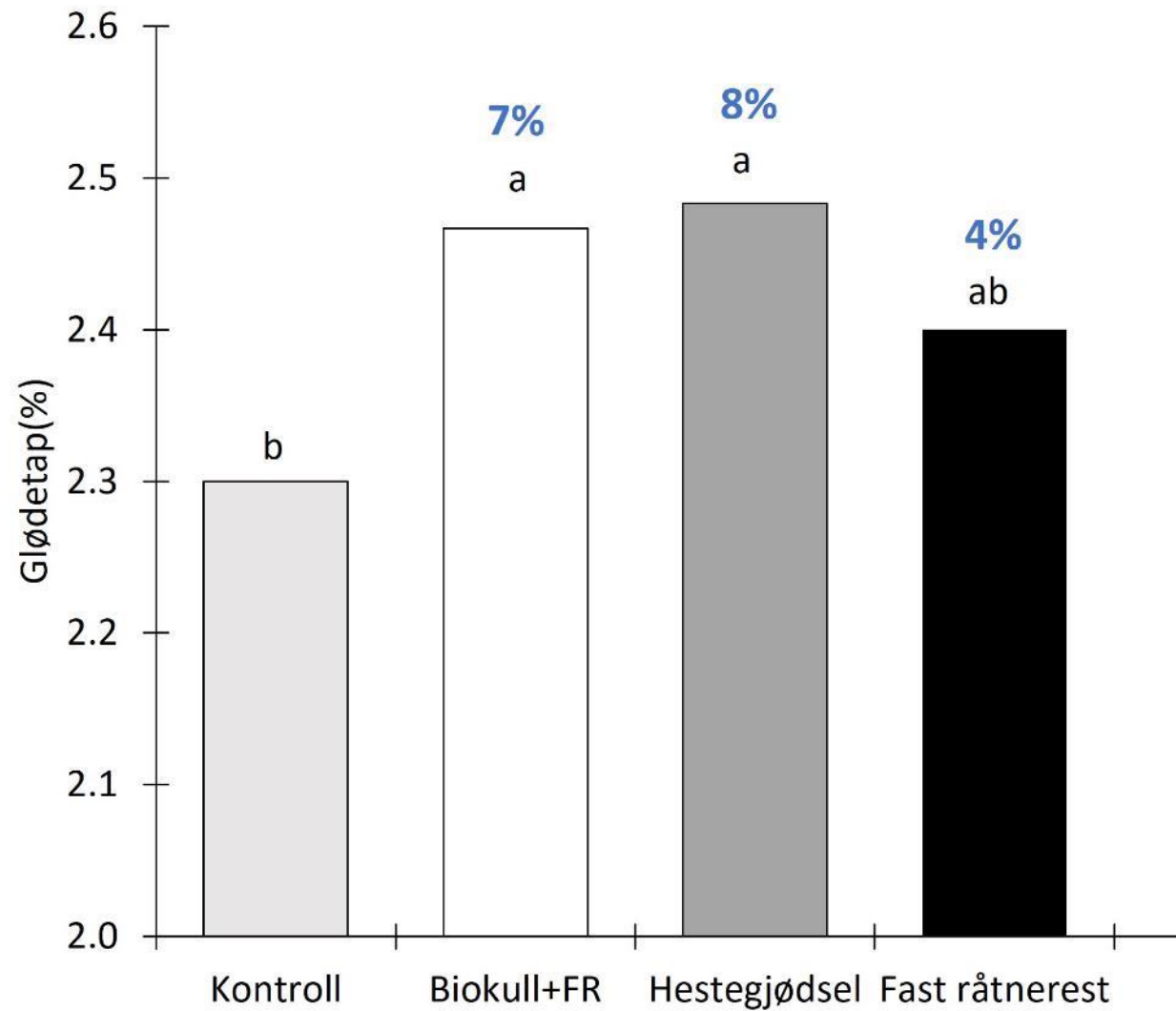


# 2019



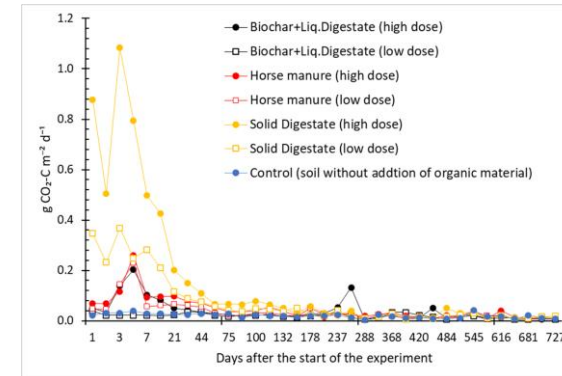
# Moldinnhold i 2021

Feltforsøk



# Potensialet for karbonlagring

Laboratorieforsøket



Organisk materiale

Maksimum tid i jord (år)

Biokull+FR

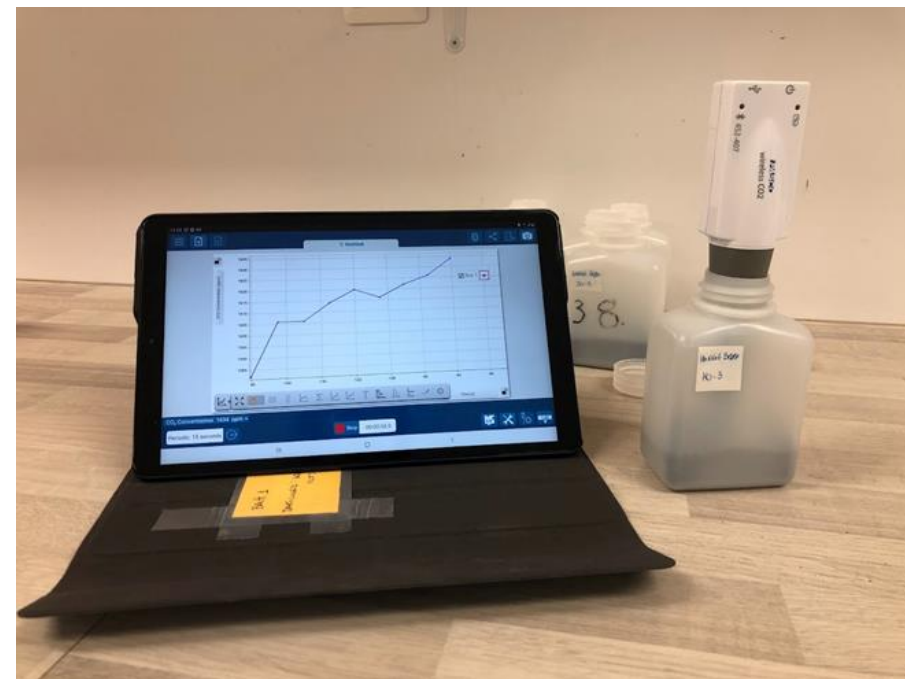
32

Hestegjødsel

8

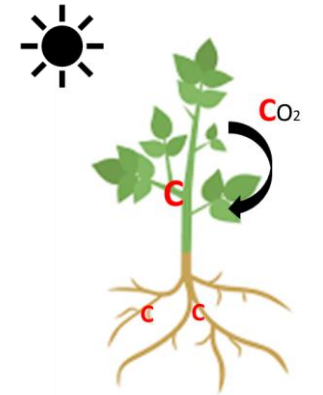
Fast råtnerest

3



# CAPTURE: fangvekster i kornproduksjon

(2021-2025)



Fangvekster for å øke karboninnholdet i jorda

*Fôrvikke (SV)*



*Italiensk raigras (IR)*



*Honningurt (PH)*

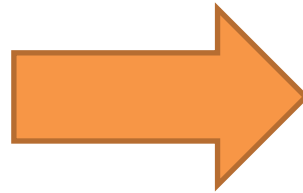
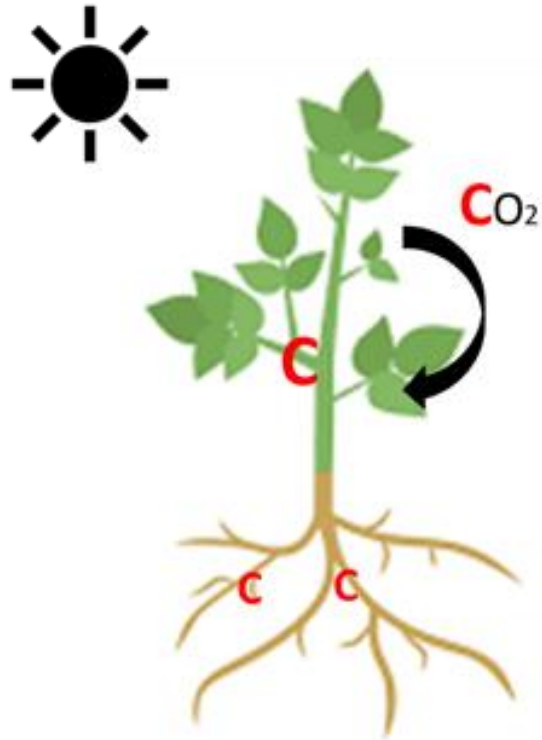


*Oljereddik (OR)*

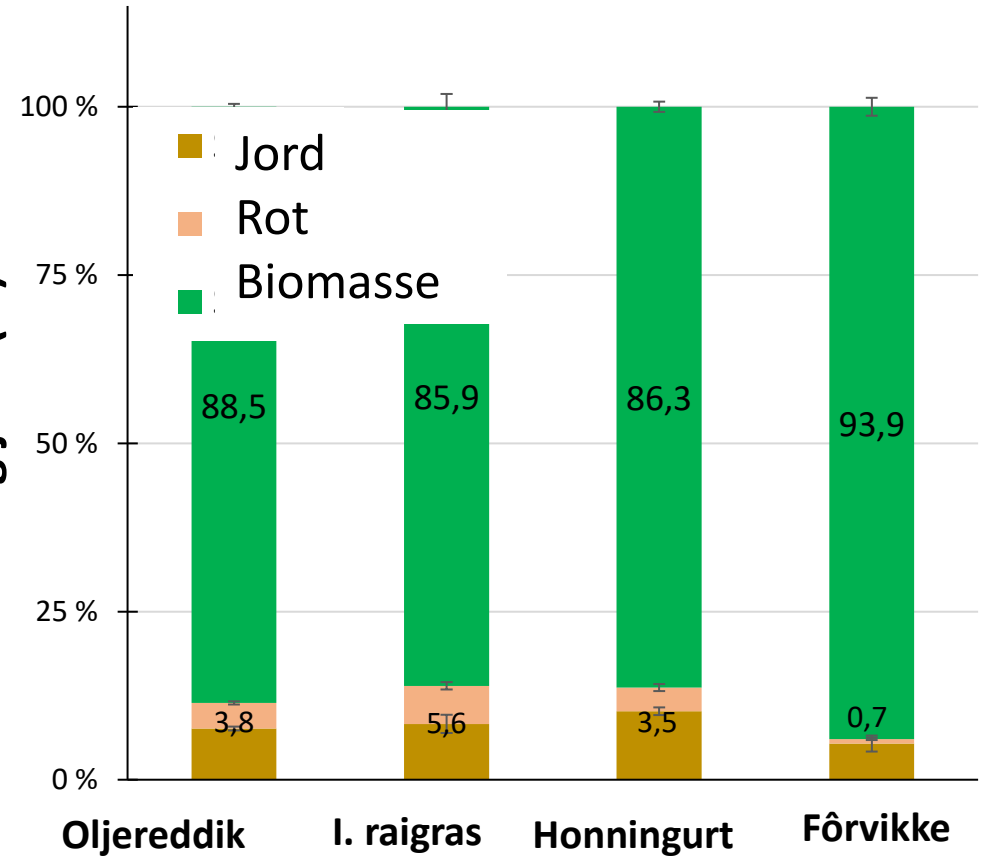


# CAPTURE: Fangvekster for å lagre karbon

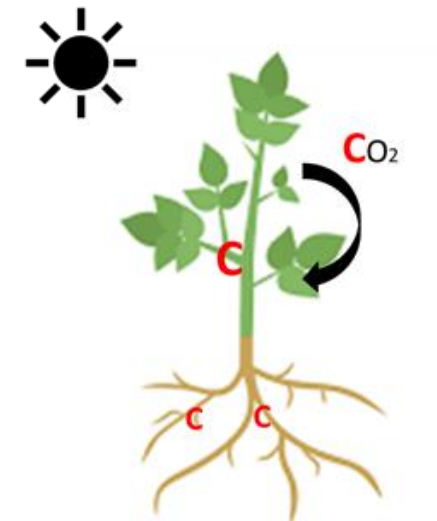
## Fotosyntese



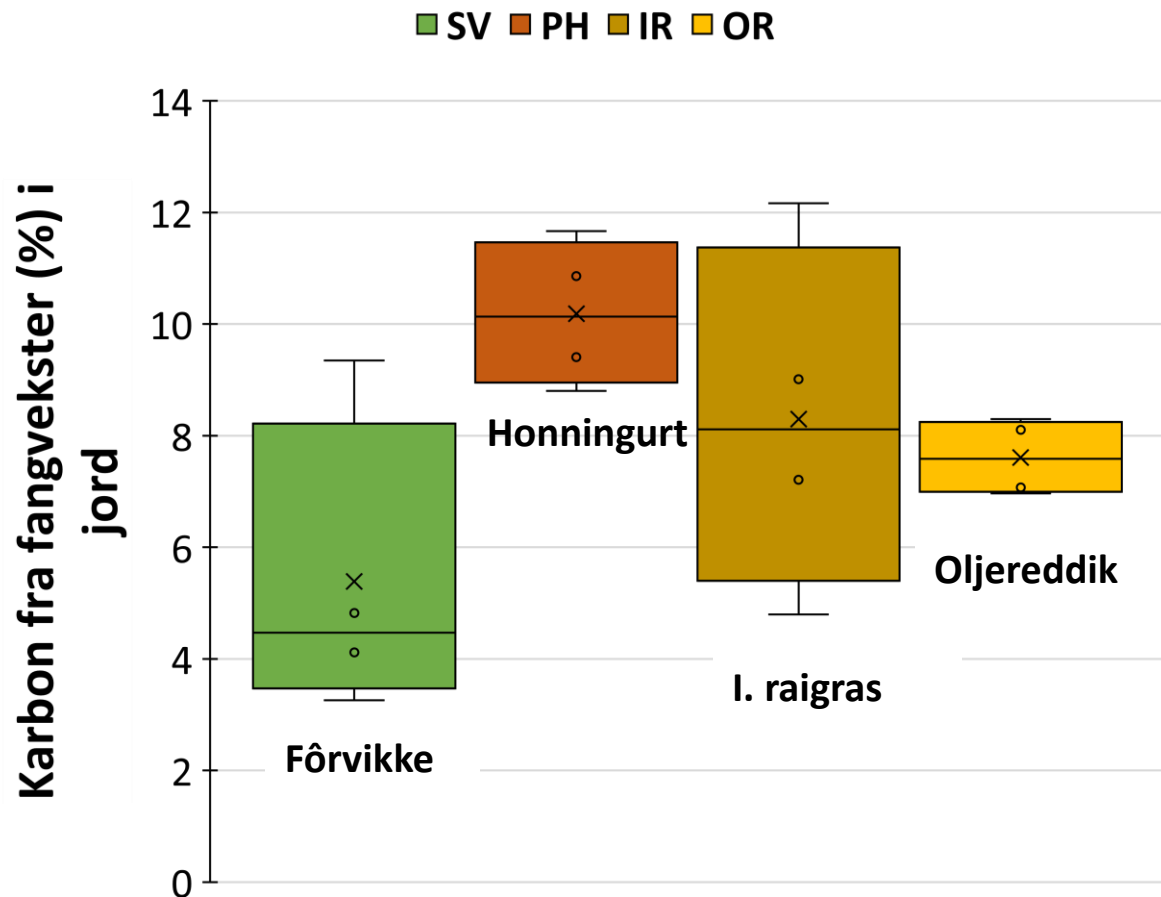
Karbon fra fangvekster i plante og jord (%)



# CAPTURE: Fangvekster for å lagre karbon



Resultater fra september 2021



# CAPTURE: Motstandskraft mot nedbryting

## Jordfraksjoner

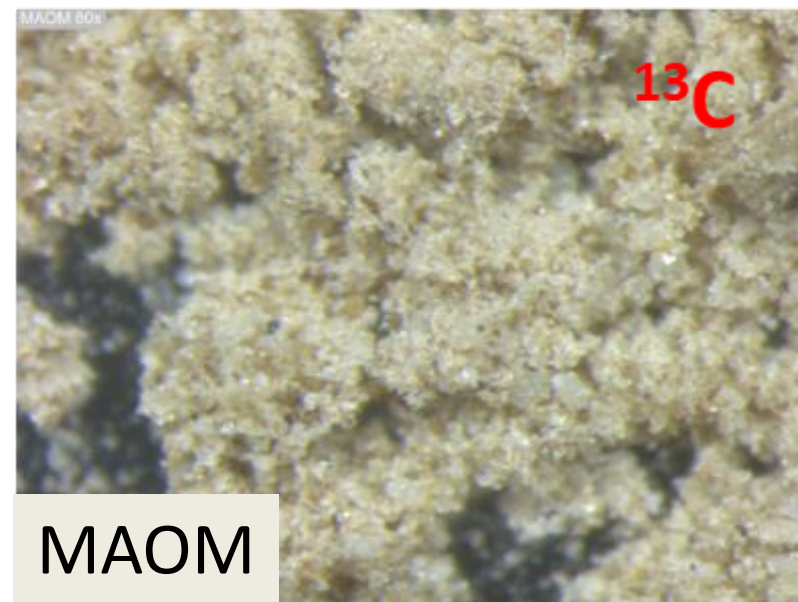
### Jordhelse



POM

**POM: Particulate Organic Matter**

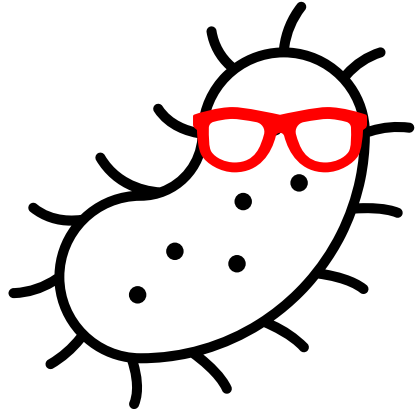
### C-lagring



MAOM

**MAOM: Mineral-Associated Organic Matter**

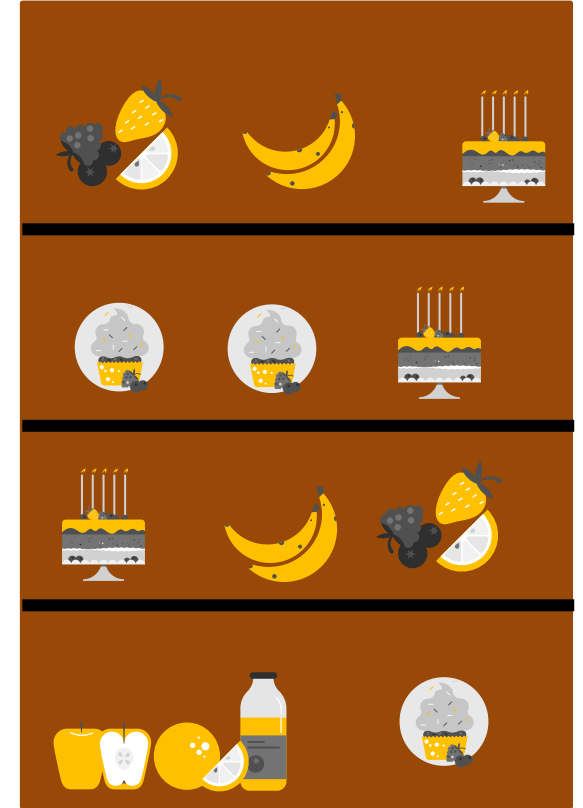
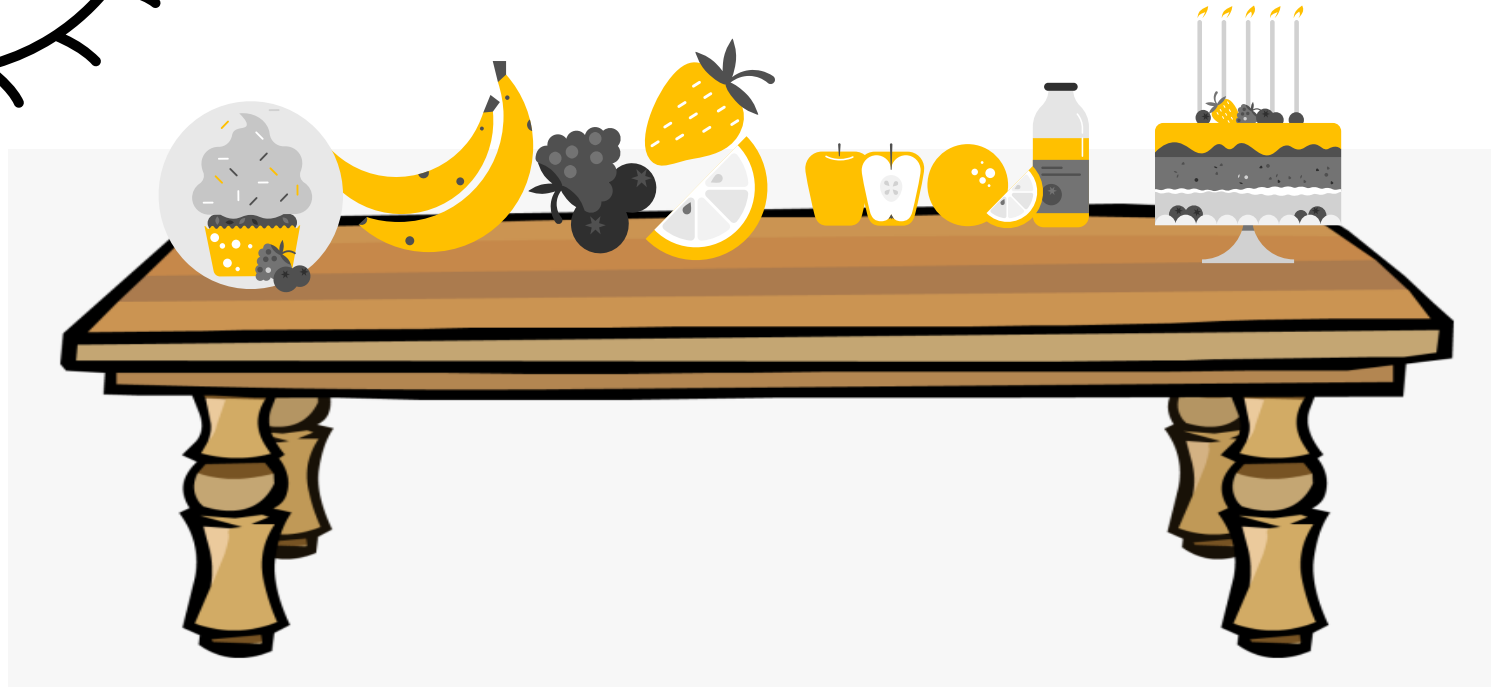
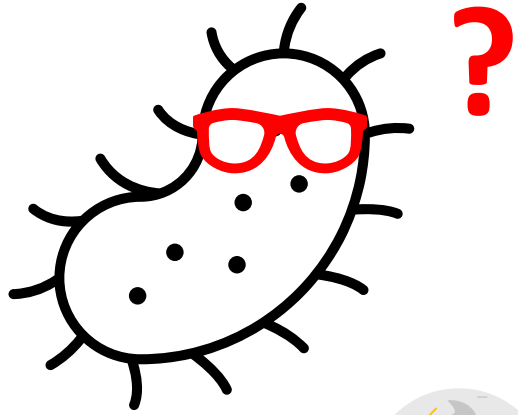
# Jordfraksjoner



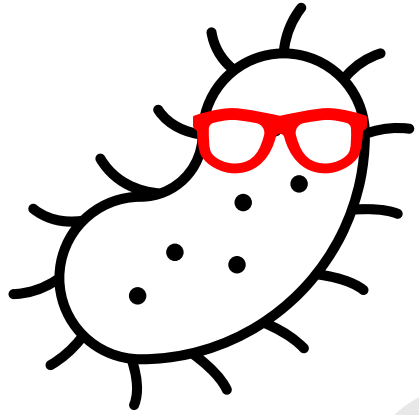
Jordmikrobe



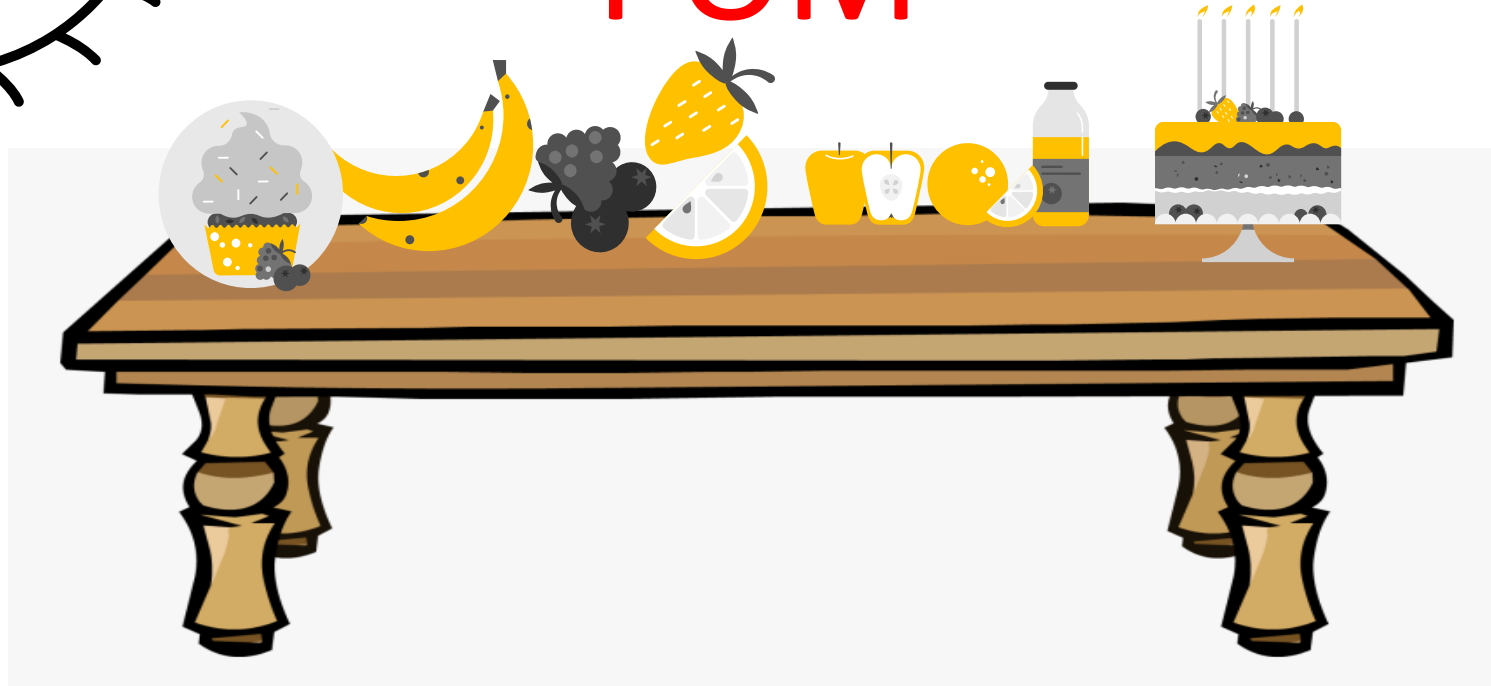
# Jordfraksjoner



# Jordfraksjoner



## POM



## MAOM

### C-lagring



# Tingvoll gård og SoilEffects: Lenge tid feltforsøk

Tingvoll gård (1990 - )



SoilEffects feltforsøk (2011 - )



# Tingvoll gård – økologisk melkeproduksjon

Veldig Høy

Organisk materiale i jord (%)

1985 1995 2005 2015 2025

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

Høy

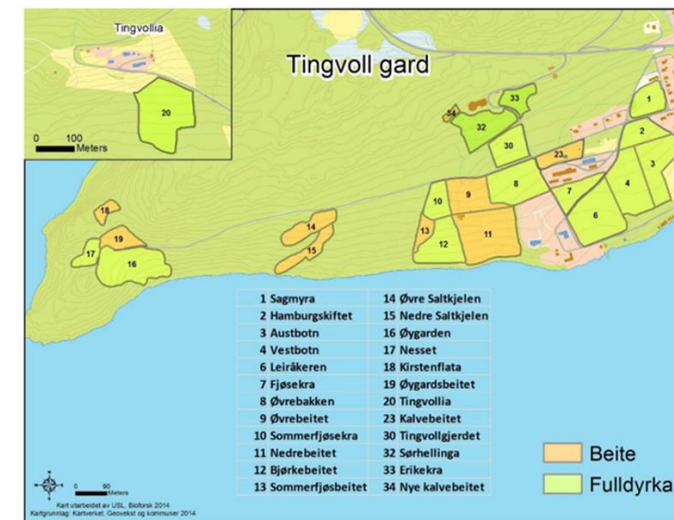
Organisk materiale i jord (%)

0 1985 1995 2005 2015 2025

Lav

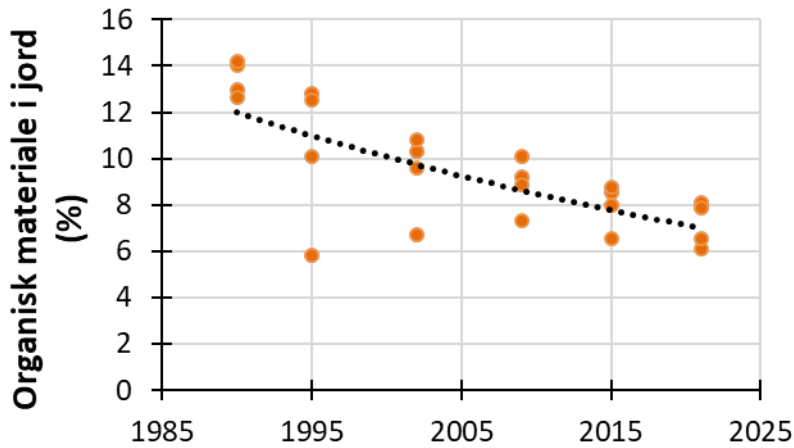
Organisk materiale i jord (%)

1985 1995 2005 2015 2025



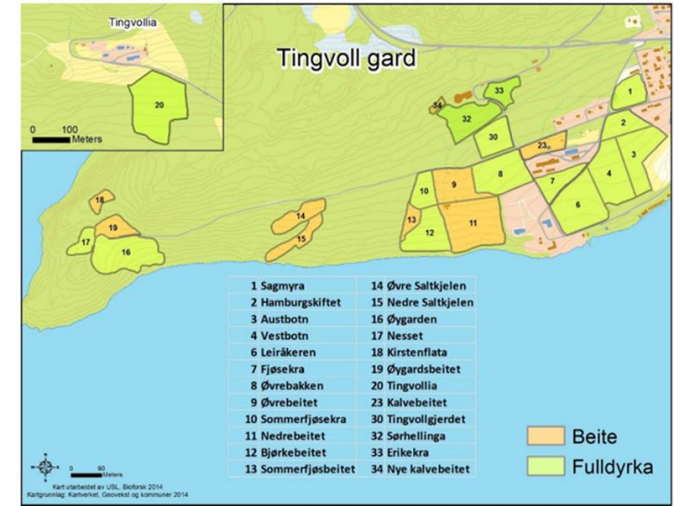
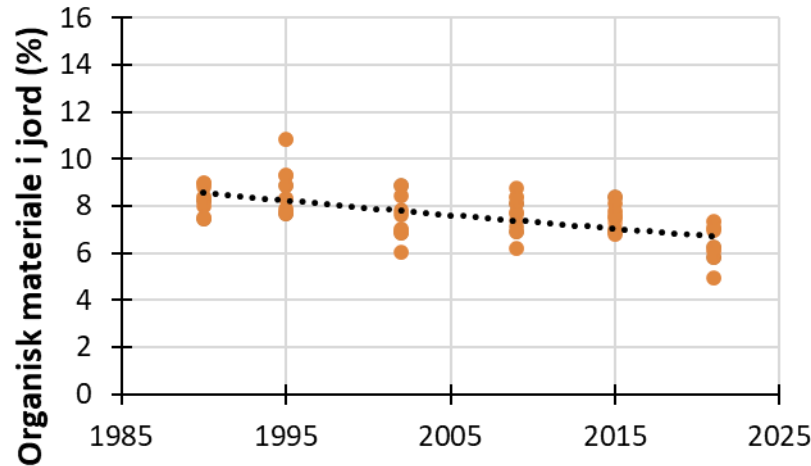
# Tingvoll gard – økologisk melkeproduksjon

Veldig Høy

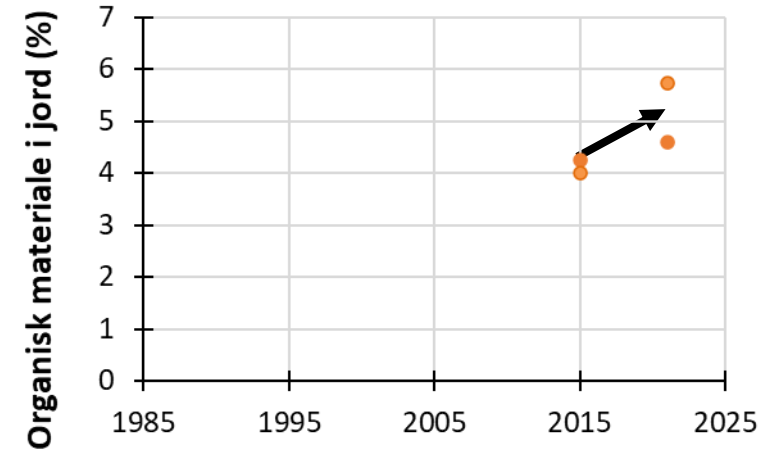


Veldig høy: SOM >12%  
 Høy: 6 < SOM < 12%  
 Lav: < 6%

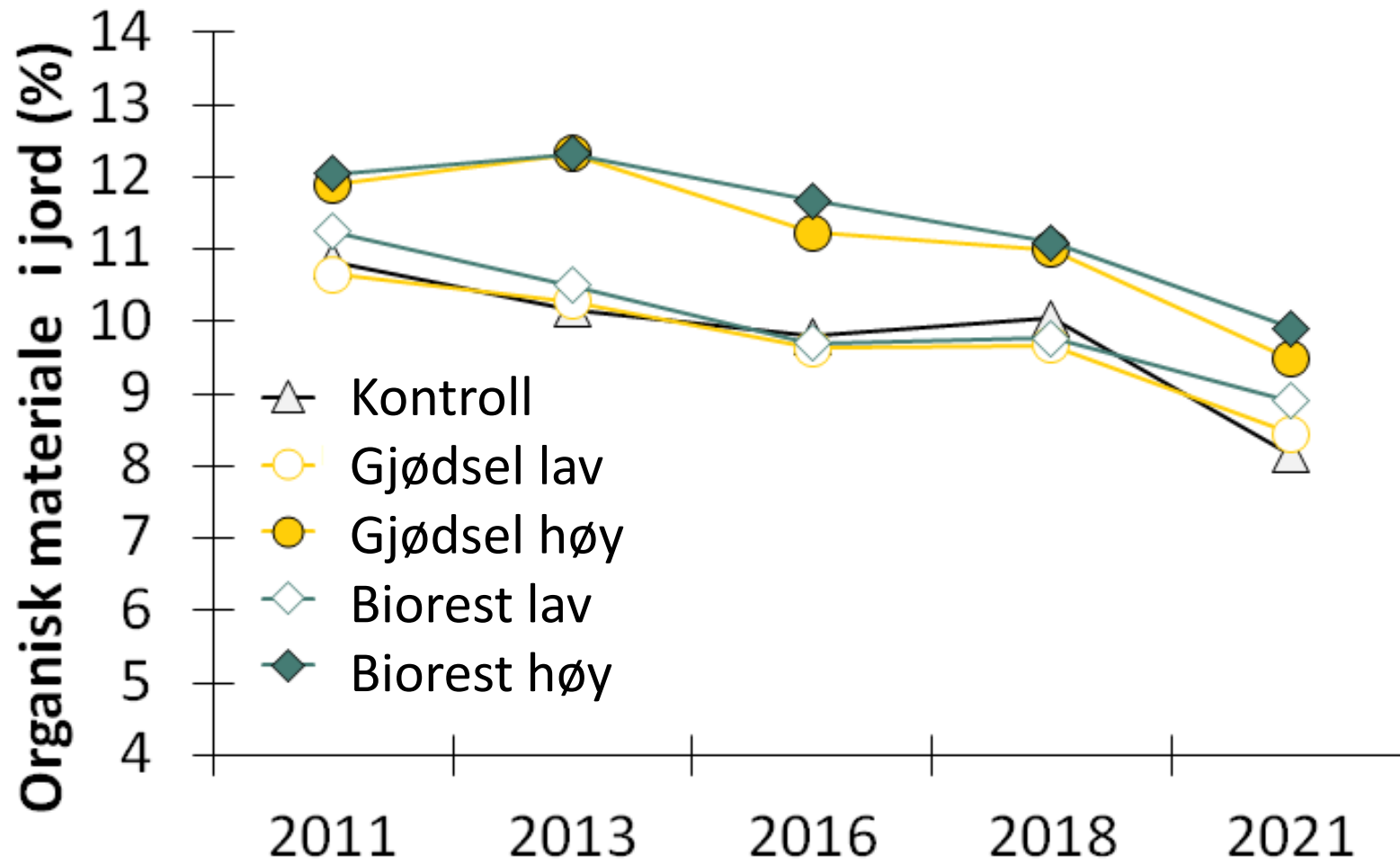
Høy



Lav



# SoilEffects feltforsøk



## Gjødsel

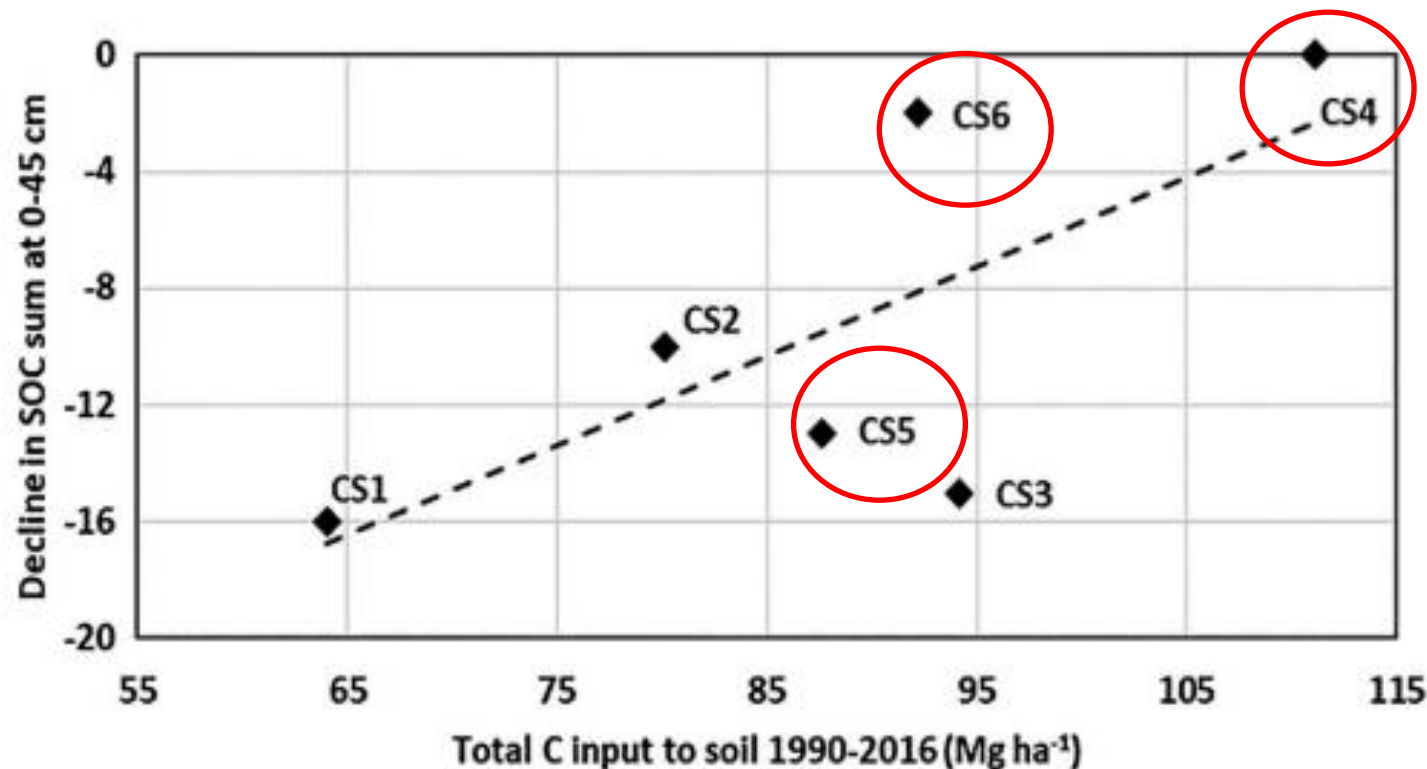


## Biorest



Lav C i jord:

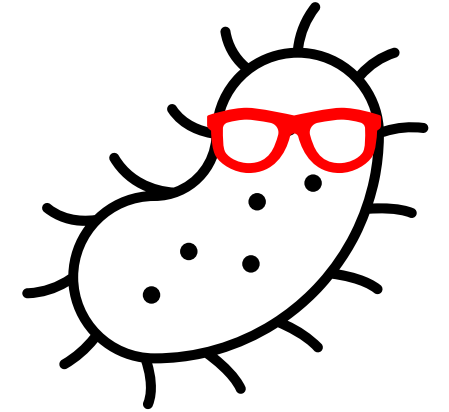
**Apelsvoll : 2-3 % C i jord**



**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

# Hva vi har lært



- Øke C-lagring i jord er ikke lett
- Innhold av karbon i jorda ved start er viktig
- Karbonbinding og *C persistence* er nøkkelen til karbonlagring
- Vi trenger lang-tidsforsøk med måling av karbonlagring
- Nettverk med feltforsøk er viktig for å forstå prosessen og regionale forskjeller



# KARBONKALKULATOR FOR JORD



## Takk for meg

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<https://www.agropub.no/fagartikler/kalkulator-for-karbonmengde-i-jorda>

