Innovation Centre
for Organic Farming

On-farm innovation in the CarbonFarm project

Senior advisor, Anton Rasmussen.

CARBON FARM

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Carbonfarm objectives

- Develop, test and document sustainable farming systems based on conservation agriculture principals in both organic and conventional farming CA
- CA: 1 minimum tillage and soil disturbance. 2 permanent soil cover with crop residues and live mulches. 3 crop rotation and intercropping
- In 4 living labs placed on four Danish farms.

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Carbonfarm partners

Partners:

Innovationscenter for organic farming (project coordinor)

Danish low-till association, FRDK,

Aarhus University, Dept. of Agroecology,

Copenhagen Universitet, Dept. of plant and enviromental science

Yding Smedie og Maskiner.

4 Farmers: Anders Lund, Per Bundgaard, Jacob Justesen, Søren Havgaard Christensen

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Carbonfarm innovation and development

- Develop and implement a sustainable system with CA elements suitable for Danish organic farming systems.
- Implement, improve and document CA systems for conventional farming in a Danish context
- Develop mechanical solutions for Danish CA primarily in organic LL
- Demonstration and dissemination of project results to farmers, researchers and advisory services

- field days, seminars, webinars, visit from local and international farmers/experts, manuals, videos and articles etc.

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Carbonfarm research

- **Agronomic, climate and environmental effects of CA systems:**

Soil structure, weeds, yields and quality, GHG emissions; nutrient assimilation - and leaching, etc.

- **Effects of CA systems on biodiversity**

Bees, beetles, earthworms, soil surface predators, antipodes (collembola), Arbuscular mycorrhiza, etc.

- **Effects and mechanisms of CA for building up the soil carbon content**

Measuring and modeling carbon content in LL soils

for Økologisk Landbrug

CarbonFarm – Living lap – Field trials

Treatment 1: Reference (Normal tillage intensity with plowing). Limited use of catch crops .

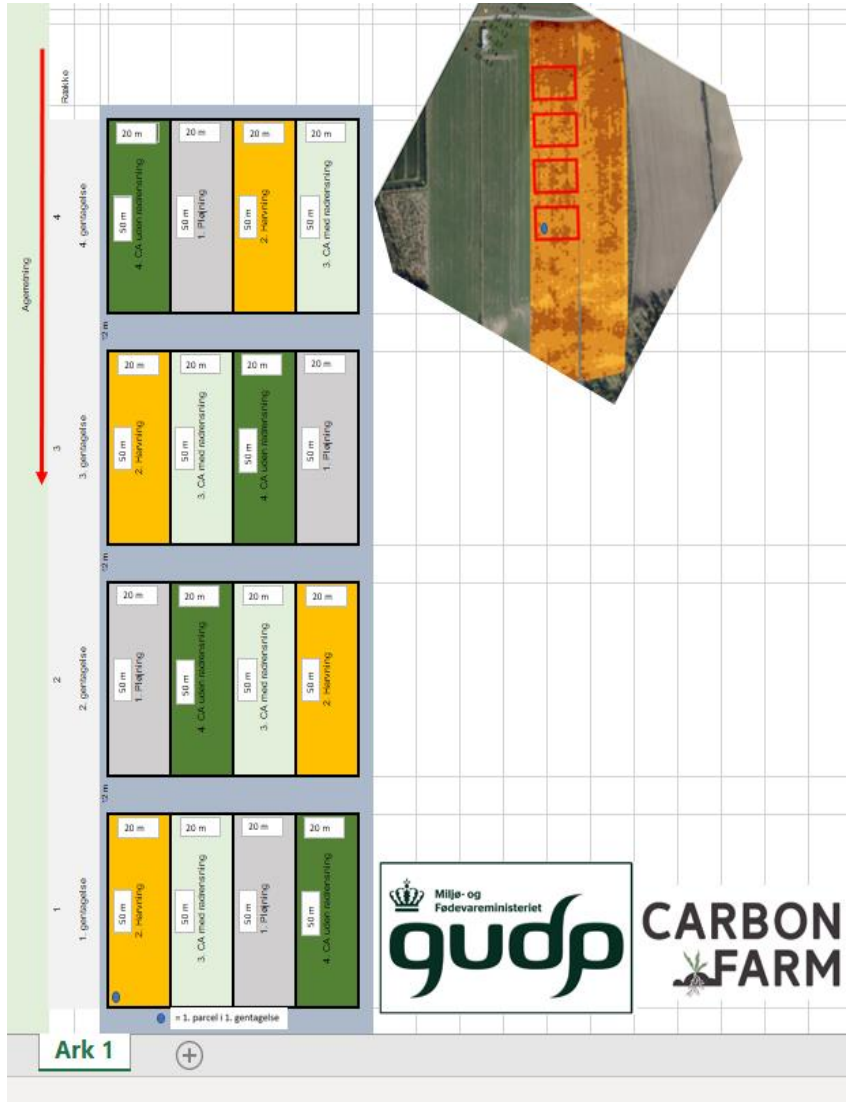
Treatment 2: "Low tillage". Without ploughing mainly cultivation by harrowing and use of catch crops.

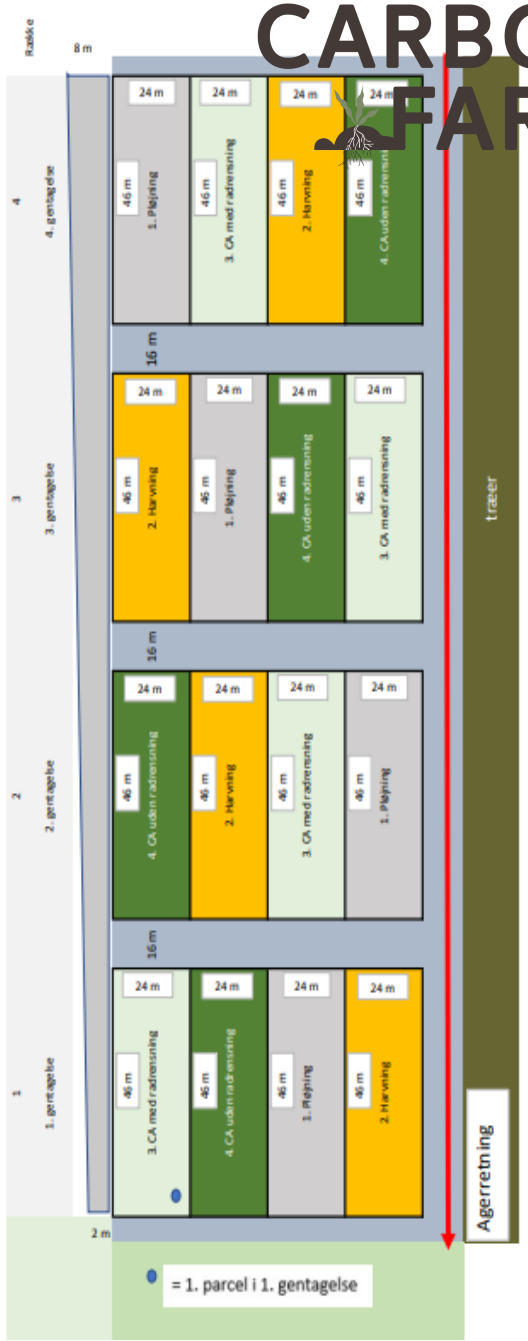
Treatment 3: CA "Minimal tillage, " leaving plant residues and optimal use of catch crop in mixtures.

Treatment 4: CA "Carbon optimizing", with minimal tillage

Carbonfarm Living lab/field trials

- Started 2017
- 4 farmers
- 2 conventional and 2 organic
- 4 treatments/systems with 4 repetitions
- Plots 20 – 24 x 50 meters
- Trials run by/with farmers using their own machinery – with a few exceptions





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Yields and crop rotation organic trials

- August 2017: 2-3 kg/ha honningurt, 4-6 kg/ha olieræddike, ca. 40 kg/ha vårbyg
- 2018: Fababeans
- 2019: Rye
- 2020: Oats
- 2021: Rye og Barley/peas lay of microclower in CA-trials
- *2022: oats*
- *2023: vinter cerial*
- *2024: not decided*

Hestebønner 2018			**Havre 2020**		
	Anders	Per		Anders	Per
Behandling	hkg/ha	hkg/ha	Behandling	hkg/ha	hkg/ha
1	Ikke høstet	10,9	1	48	Ikke høstet
2		11.1	2	35	
3		10,7	3	Ikke høstet	
4		11,1	4	Ikke høstet	
Vinterrug 2019			**2021**	**Byg/Ært**	**Rug**
Behandling	hkg/ha	hkg/ha	Behandling	hkg/ha	
1	8,1	31,1	1	ikke klar	63,2
2	15,7	41,4	2	ikke klar	62,4
3	18,1	43,8	3	ikke klar	ingen høst
4	10,2	3,8	4	ingen høst	ingen høst

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Conclusions from the organic LL from 2018-2021

CA is not a ready ‘out of the box’ system in organic farming compared to conventionel systems.

Intensive use of undersown catch crops to controlle weeds was not efficient

Implmenting all CA princippels has not given given sufficient yields.

How can we rethink CA to succed in an organic danish croprotation?

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New Organic CA concept

- Establish af living mulch of micro clower
- Sow in narrow tilled sribs in the living mulch
- Cut the clower between croprows.
- Develop machine prototypes to use in organic trials.

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Establishing living mulch (microclower) at organic trials

East jutland april 2021

Anders juni 2021

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North Jutland august 2021

Foto: Anton Rasmussen

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Test of a prototype in august 2021

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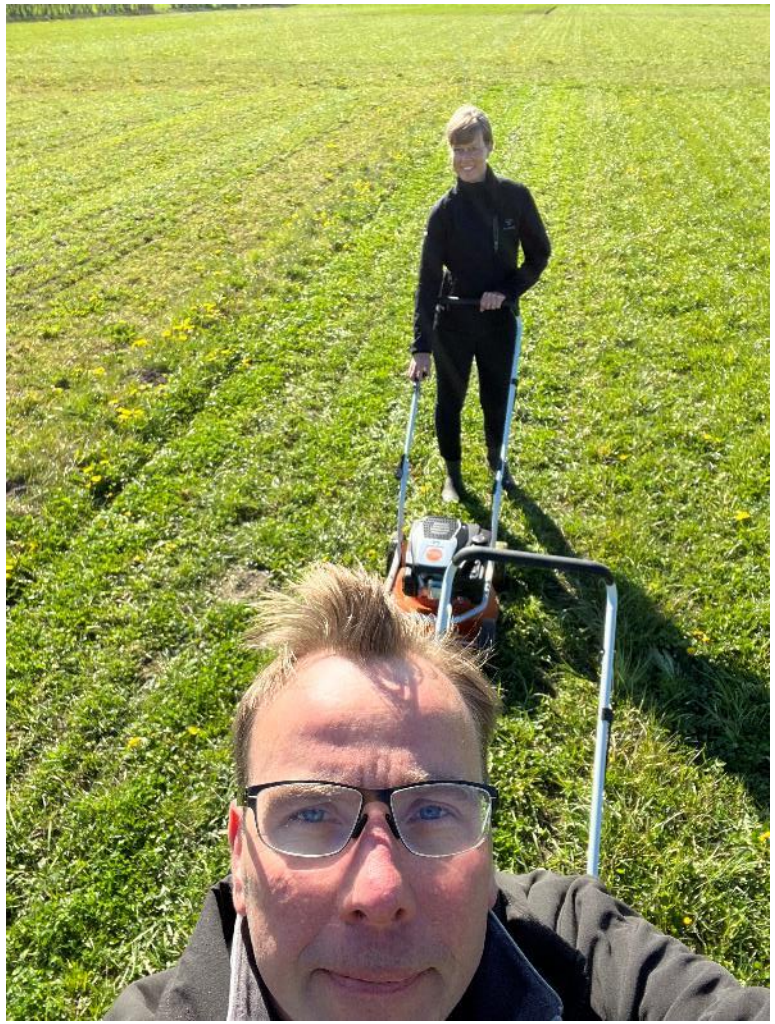
Prototype 0.1



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Building prototype 2.0

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2 Mowing with prototype may 22

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5 Cutting 8 juni

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Video about Carbonfarm (in Danish)

https://www.youtube.com/watch?v=VD0hPdOZaUo

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