Fall 2023 Plant Science Seminar Series

Fridays 1:25-2:15 pm
Ferguson Bldg Rm 205

8/25/23:
Welcome to the new AEPS grad students!

9/1/23: Kathy Shumac
Research Support Technologist III
Greenhouse worker protection training

9/8/23: Maisie MacKnight
PhD Candidate, Ecology, PSU
Building inclusive field work cultures: you have a right to know!

9/15/23: Rasmus Emil Jensen
Specialists in Soil Health and Cropping Systems for SEGES Innovation
Innovation on soil-tillage and regenerative farming in a Danish context

9/22/23: Charlie White
Assistant Professor, PSU Plant Science
Improving Nitrogen Recommendations for Corn in Pennsylvania

9/29/23: Ramin SamieiFard
Ecosystem Science & Management
Solid and liquid organic fertilizers with developing approaches in future agriculture.

10/6/23: Jill Hamilton
Associate Professor & Director, Schatz Center for Tree Molecular Genetics; PSU-ESM
Title TBD

10/13/23: Armen Kemanian
Professor of Production Systems and Modeling PSU Plant Science
Title TBD

10/20/23: Sohini Guha
Postdoctoral Researcher, PSU Plant Science
Perturbation of known Medicago symbiosis genes tend to influence host traits more than rhizobial fitness in multi-strain inoculations

10/27/23: Leah Fronk
AEPS Graduate Student & Extension Educator
Weeds as hosts to Colletotrichum Species affecting strawberry

11/3/23: Barney Geddes
Assistant Professor, North Dakota State University
Title TBD

11/10/23: Katya Bazilevskaya
Director of Soil Resource Cluster Lab
Soil Research Cluster Lab: instrumental capabilities and applications

11/17/23: Tyler Groh
PSU Watershed Management Extension Specialist
Assessing Potential Water Quality Benefit & Limitations in Pennsylvania Riparian Buffers

11/24/23
Thanksgiving-No Seminar

12/1/23: Lynn Sosnoskie
Specialty Crop Weed Scientist, Cornell University
Novel Weed Management: Precision Spraying, Electrical Weeding and Beyond

12/8/23
No seminar

Innovation on soil-tillage and regenerative farming in a Danish context

Rasmus Emil Jensen and
Janne Aalborg Nielsen

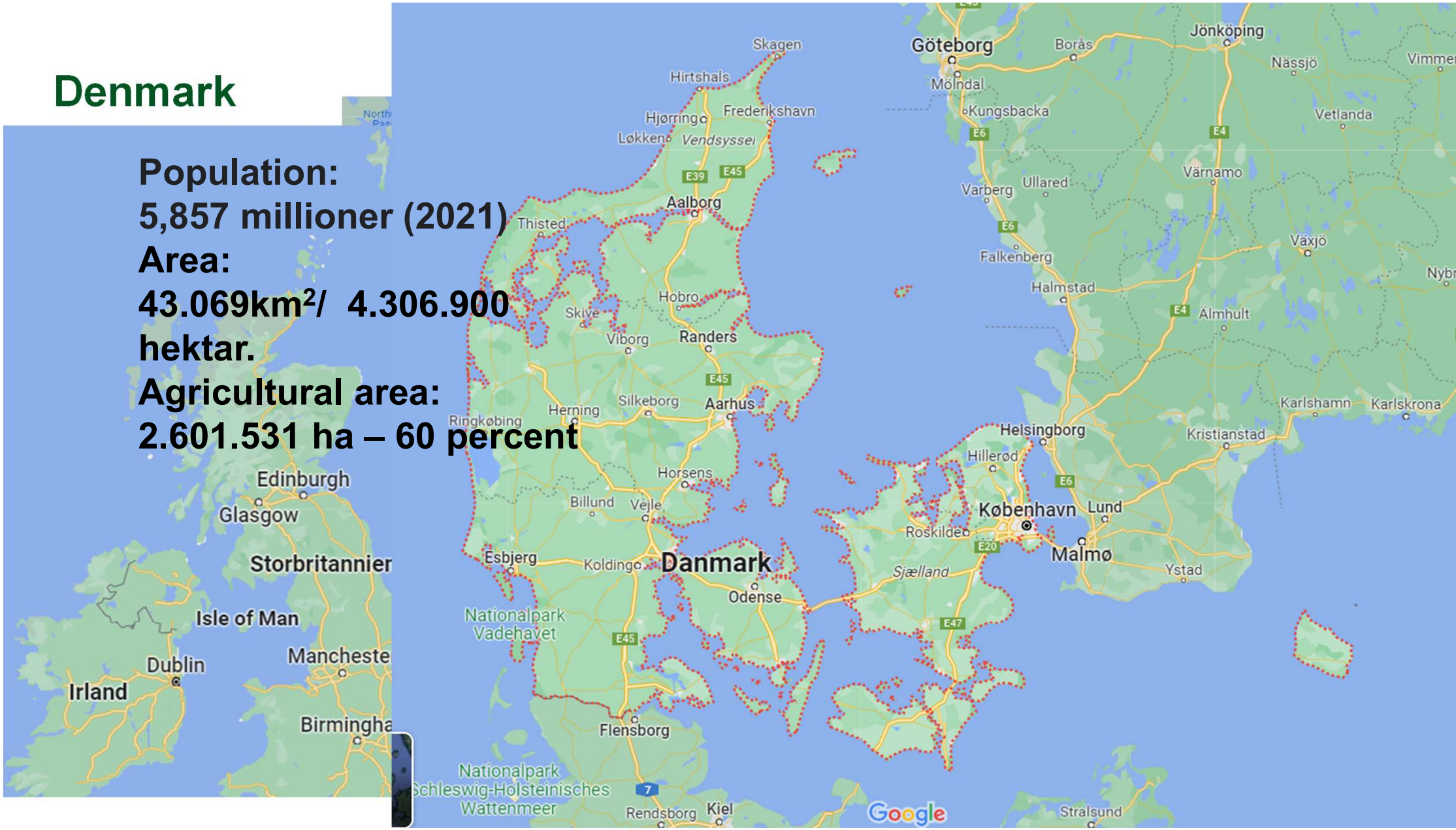
Penn State University 15th September 2023

STØTTET AF
Promilleafgiftsfonden for landbrug

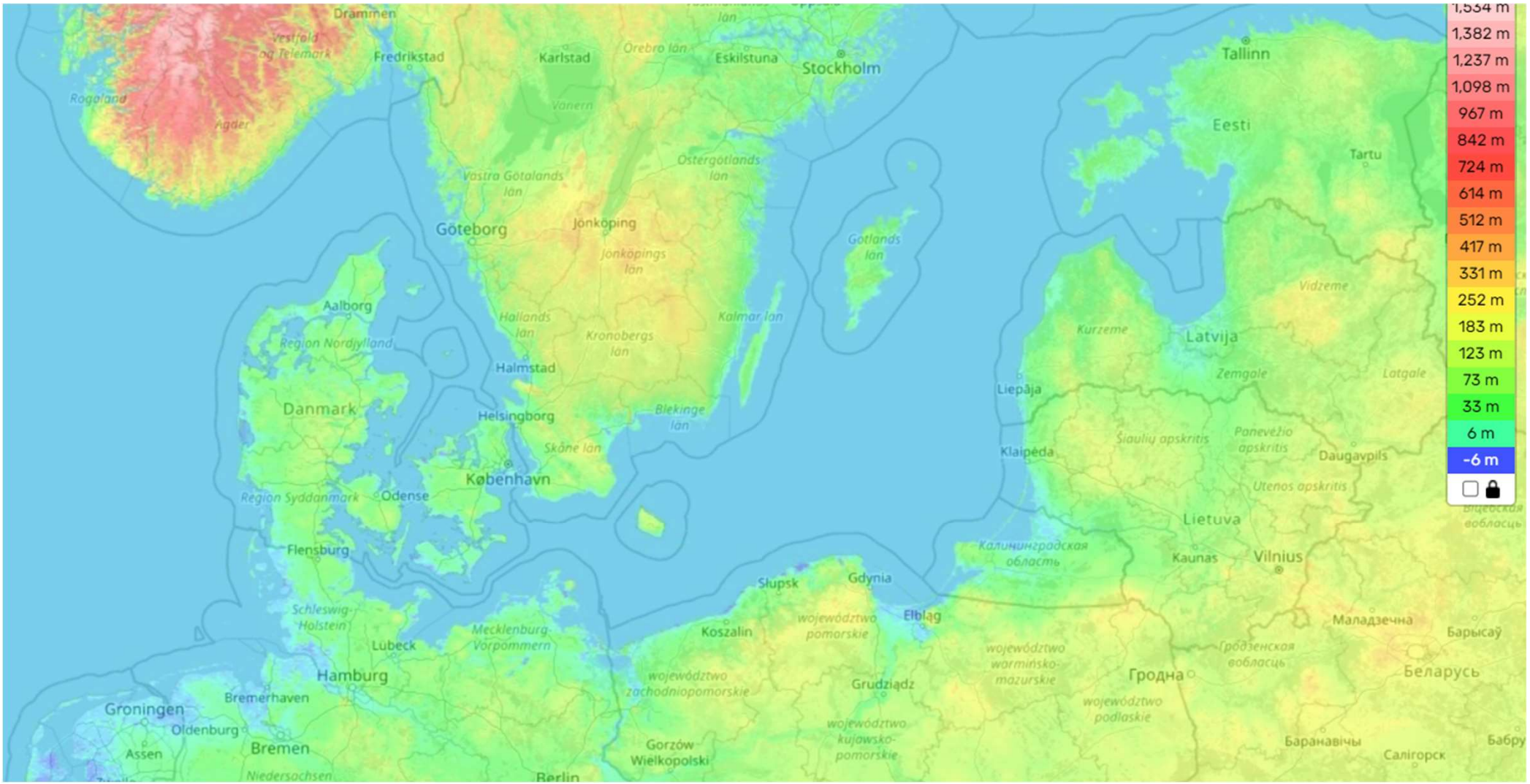
SEGES INNOVATION

Denmark

Population:
5,857 millioner (2021)
Area:
43.069km^2/ 4.306.900 hektar.
Agricultural area:
2.601.531 ha – 60 percent



Denmark is a flat country



Denmark

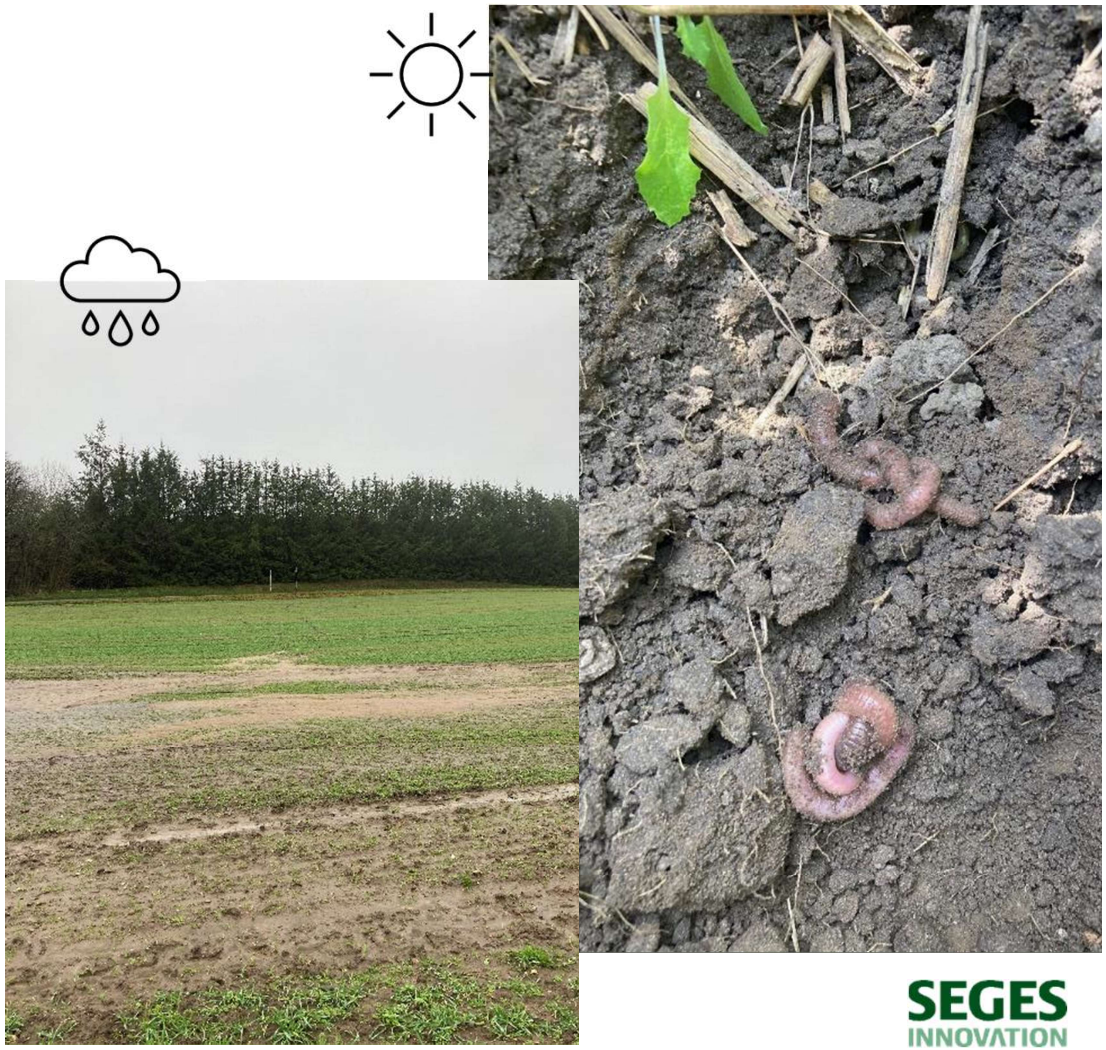
- A flat, seaside country with an average elevation barely above sea level.
- “Møllehøj” is the highest spot in Denmark – with an elevation of just **171 meters** (561 feet).
- And the coastline is never more than 50 kilometers (30 miles) away from any spot in the country.

Photo: Janne Aalborg Nielsen

SEGES INNOVATION

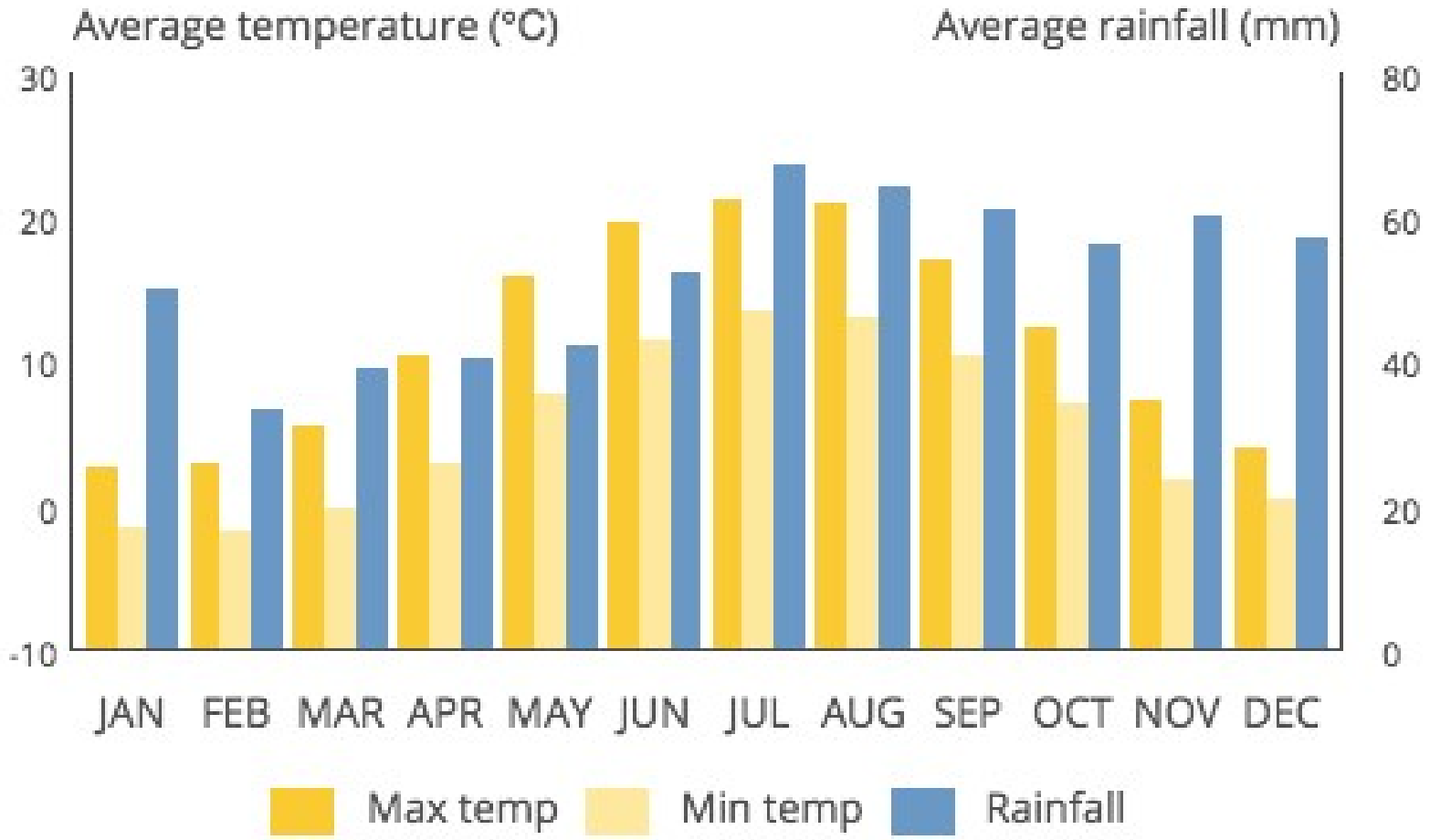
Denmark

- The Danish climate is temperate with precipitation evenly distributed over the year
- Mean annual temperature is 8.3ºC
- Mean annual precipitation is 746 mm.



Photos: Janne Aalborg Nielsen

Temperature and rainfall through the year



SEGES INNOVATION

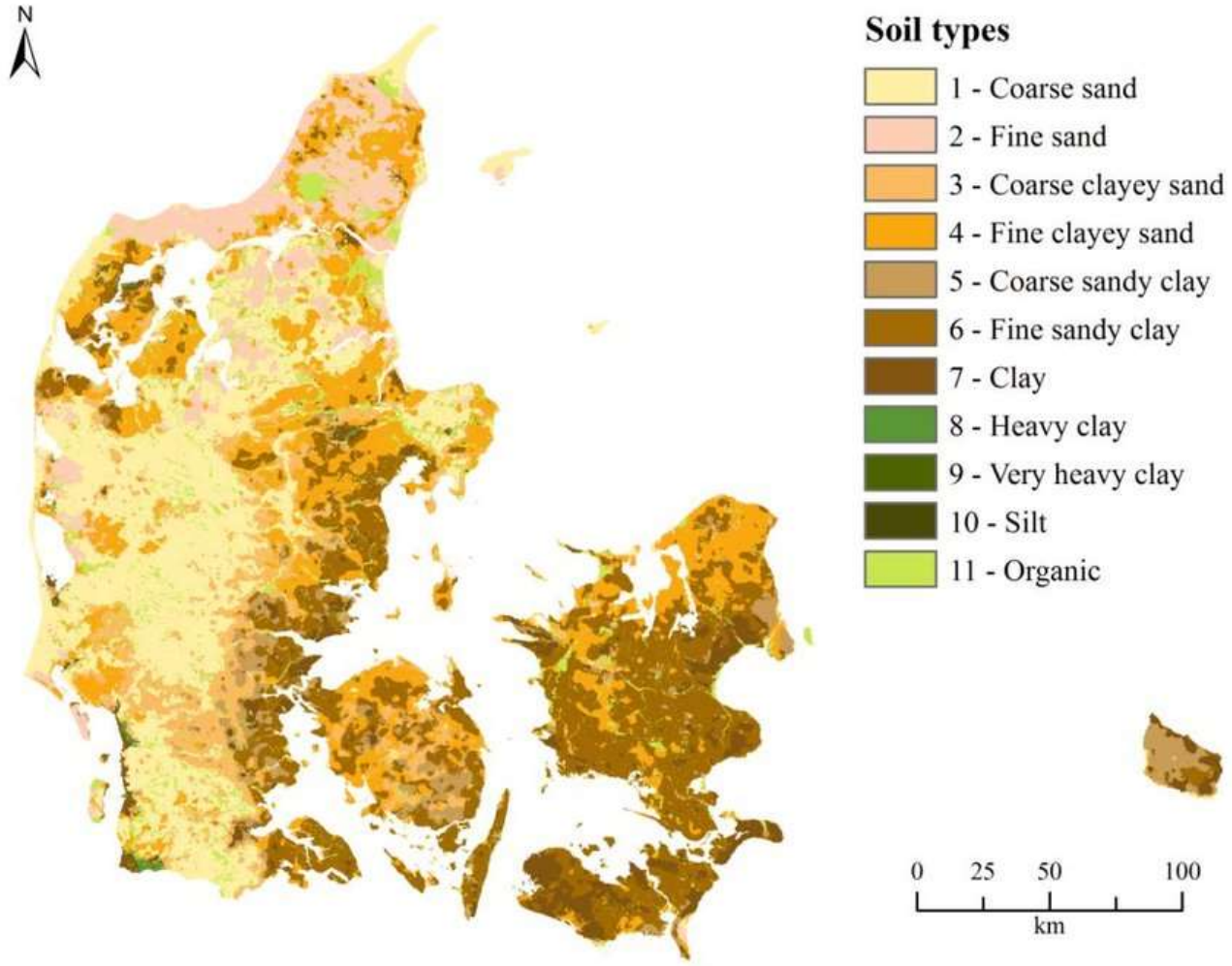
Danish soil types

- Major soil type of Denmark: coarse sand (mostly in the west of the country)
- Fine sandy clay to clay soils occupy a major part of the centre and towards the south-east.
- Northern parts of Denmark are rich in fine sands and fine clayey sand.

Photo: Janne Aalborg Nielsen

SEGES INNOVATION

Soil types in Denmark



SEGES INNOVATION

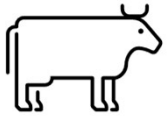
Danish soil types

	"JB-number"	Percentage by weight				
		Clay less than 2 µm	Silt 2-20 µm	Fine sand 20-200 µm	Sand, in total 20-2000 µm	Humus 58.7% C
Coarse sand	**1**	0-5	0-20	0-50	75-100	Less than 10
Fine sand	**2**			50-100		
Loamy sand	**3**	5-10	0-25	0-40	65-95	
Loamy sand	**4**			40-95		
Sandy loam	**5**	10-15	0-30	0-40	55-90	
Sandy loam	**6**			40-90		
Sandy loam or sandy clay loam (clay>20pct)	**7**	15-25	0-35		40-85	
Sandy clay loam	**8**	25-45	0-45		okt-75	
Clay or Silty clay	**9**	45-100	0-50		0-55	
Clay or Silty clay	**10**	0-50	20-100		0-80	
Peat or Muck	**11**					More than 10

SEGES INNOVATION

Danish agriculture

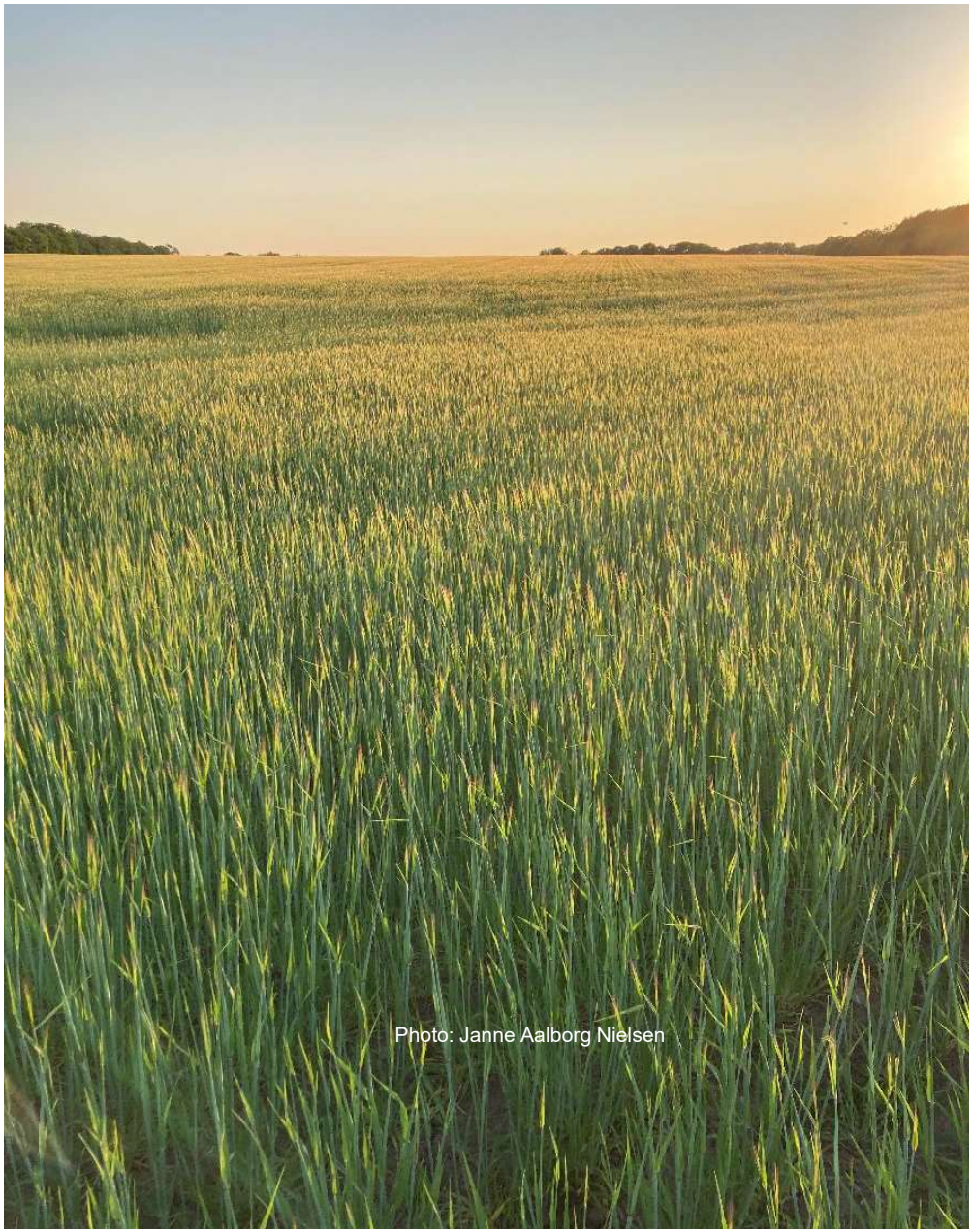
- Danish agriculture is a large net exporter of agricultural products
- The contribution of agriculture plays an important role in the country's economy The primary sector accounts for 1.5% of Denmark's total Gross Value Added (GVA).
- Pigmeat and dairy are the most important sectors in terms of production value.
- Denmark is responsible for 7% of the EU's production of pigmeat and 4% of the production of raw milk.



SEGES INNOVATION

Crops

- The main crops in Denmark are **small grains**, mainly wheat and barley, **covering more than half** of the agricultural area.
- Fodder crops, mainly **grass** and maize for silage, amounts to 780,000 hectares.
- Denmark is also an important producer of sales crops such as **rape seed, sugar beets and grass seeds** of various types.



SEGES INNOVATION

Farm size in Denmark

Farms by region, unit, type of farm, area and time

	2022
All Denmark	
Farms (numbers)	
All farms	
Total	30 678
No cultivated area	643
0.1 - 4.9 hectares	1 393
5.0 - 9.9 hectares	6 632
10.0 - 14.9 hectares	3 166
15.0 - 19.9 hectares	2 063
20.0 - 24.9 hectares	1 569
25.0 - 29.9 hectares	1 171
30.0 - 39.9 hectares	1 740
40.0 - 49.9 hectares	1 312
50.0 - 59.9 hectares	988
60.0 - 74.9 hectares	1 301
75.0 - 99.9 hectares	1 623
100.0 - 124.9 hectares	1 144
125.0 - 149.0 hectares	900
150.0 - 174.9 hectares	767
175.0 - 199.9 hectares	597
200.0 - 249.9 hectares	920
250.0 - 299.9 hectares	637
300.0 - 399.9 hectares	801
400.0 hectares and over	1 310

Source: Danish Statistics

SEGES INNOVATION

Min Till, No till and Conservation Agriculture in Denmark

- Around 12 percent of the Danish agricultural area is without ploughing

- Min till/direct seeding: 38.000 ha
- Conservation agriculture ? – under 10.000 ha

Photo: Janne Aalborg Nielsen

SEGES INNOVATION

Some facts about non-ploughing farmers in Denmark

- Is typically younger than the average farmer: 28 per cent of plough-free farmers are under 50, while 22 per cent of farmers are generally under 50.
- The plough-free farms are larger than the average Danish agriculture: 52 per cent of farms that cultivate without ploughing have 200 or more hectares of agricultural land, while 22 per cent of farms are generally that large.
- Plough-free land is most common among conventional farmers: 98 per cent of the plough-free area in Denmark is cultivated conventionally, while 2 per cent of the plough-free area is organic.
- All in all, the organic agricultural area accounts for 10 per cent of the Danish agricultural area.

Source: Kilde: Danmarks Statistik, www.statistikbanken.dk/AFG5

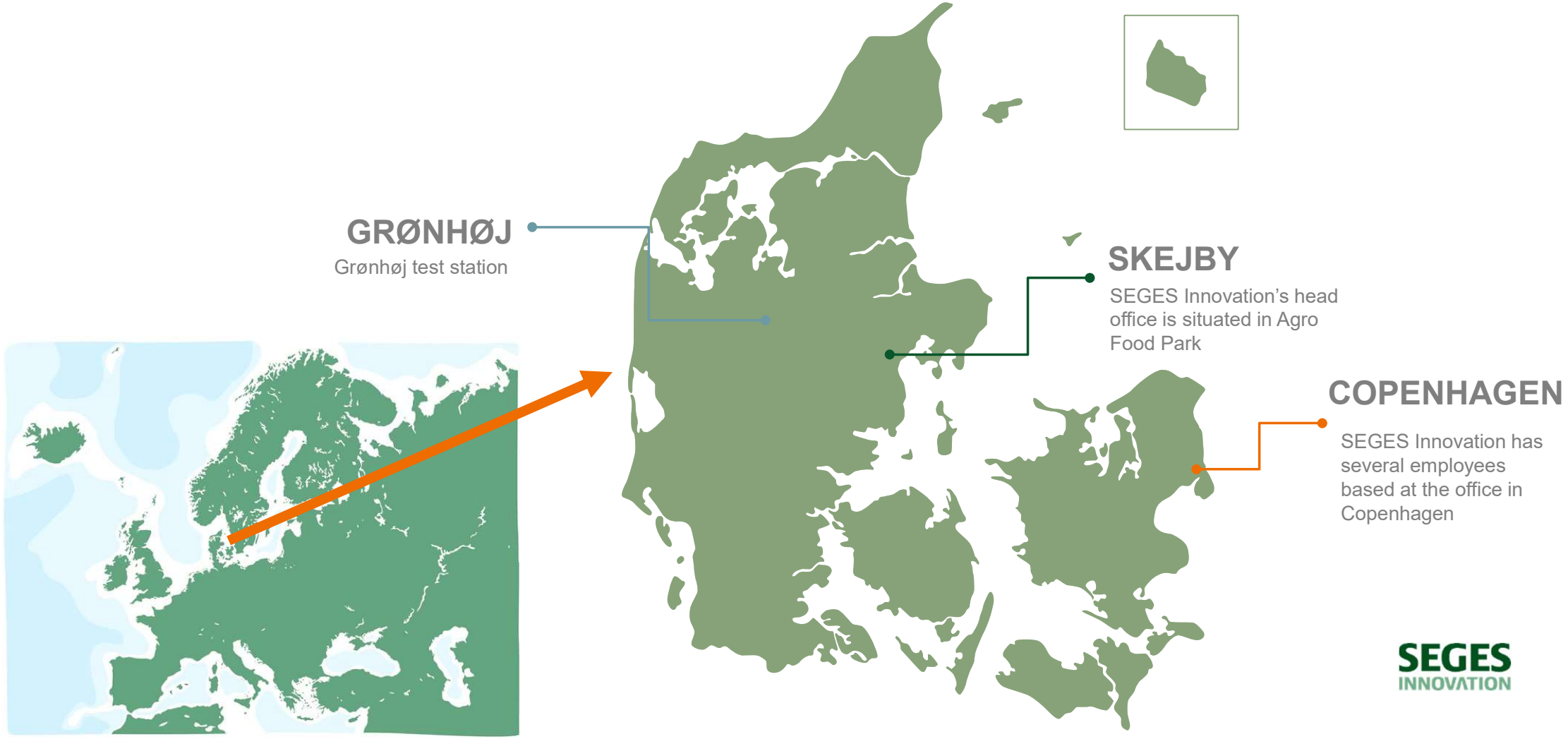
SEGES INNOVATION

This is SEGES Innovation

- https://www.seges.tv/video/83641897/this-is-seges-innovation

SEGES INNOVATION

Find us here



GRØNHØJ
Grønhøj test station

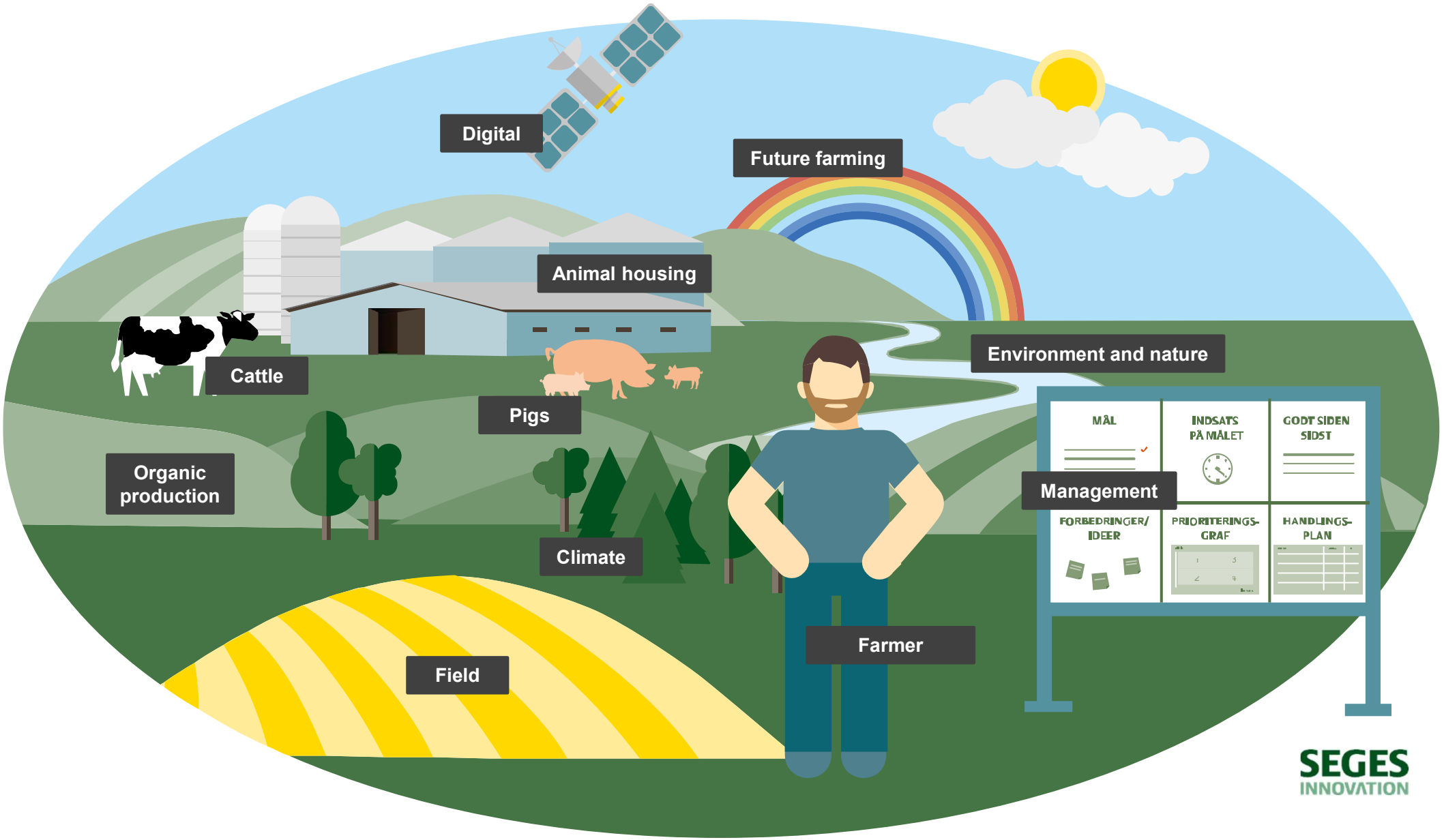
SKEJBY
SEGES Innovation's head office is situated in Agro Food Park

COPENHAGEN
SEGES Innovation has several employees based at the office in Copenhagen

SEGES INNOVATION

Employees within R&D

- Total employees in SEGES Innovation: **529** (as of January 1)
- Employees within R&D (activities within innovation for the agricultural sector): **Approx. 250**



SEGES INNOVATION

Innovation

LICENSE TO PRODUCE

Environment / nature / climate / antibiotic / phosphorus/ animal welfare etc.

KNOWLEDGE AND TESTING

National trials/feeding standards/Rule info/Warning network/The Danish Applied Pig Research Scheme/conferences etc.

NEW PRODUCTS AND SOLUTIONS

Software/guidelines, courses/Business Intelligence, etc.

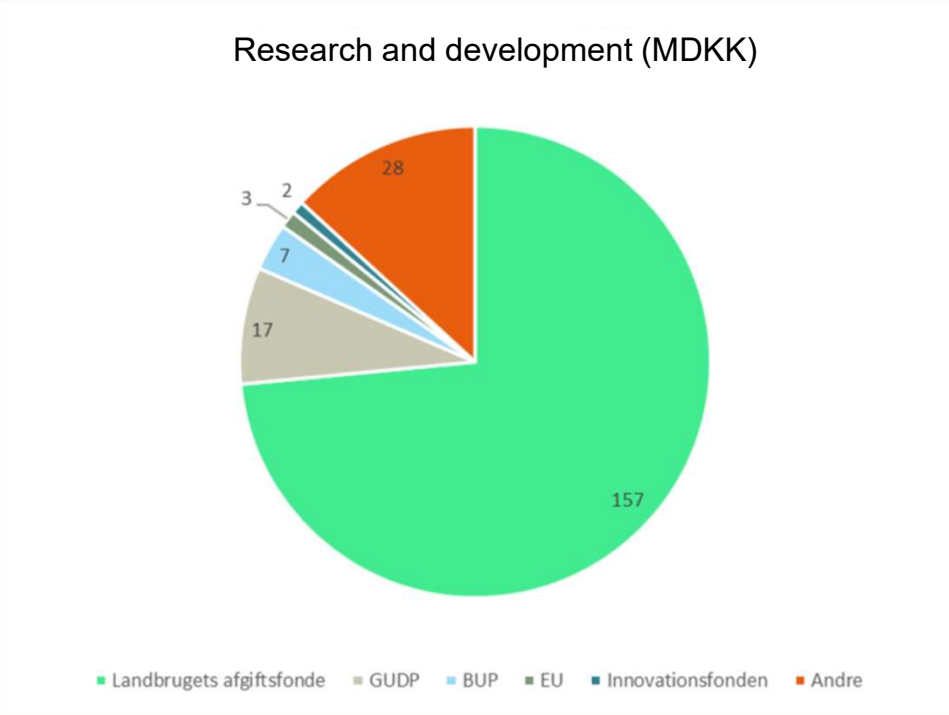
PRODUCTIVITY AND COMPETITIVENESS

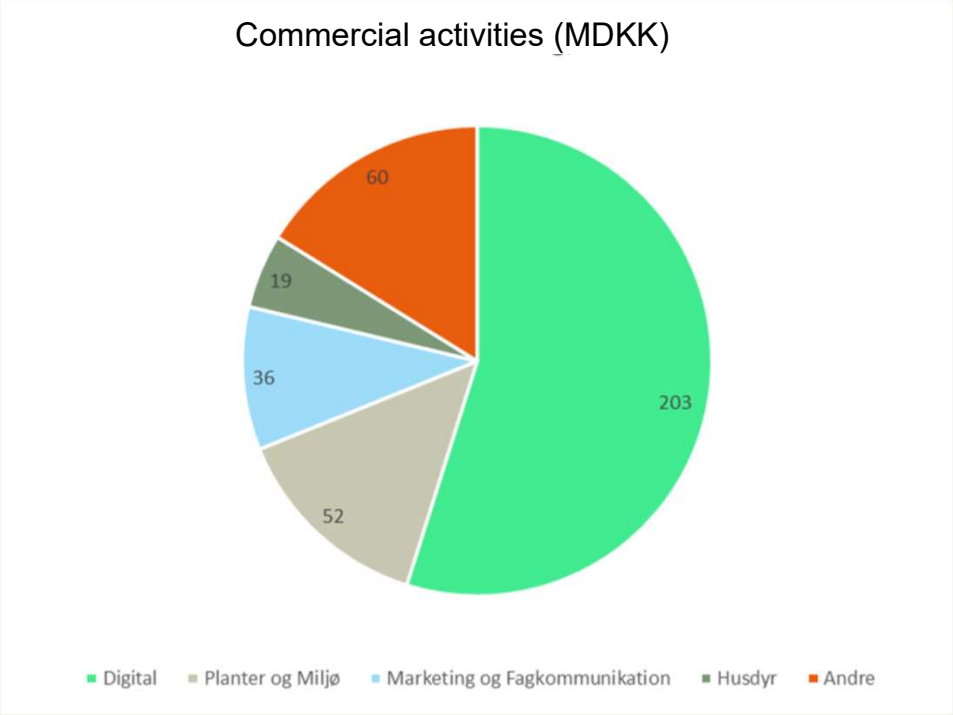
Bottom line/Legal & tax/financial analysis/strategy etc.

SEGES INNOVATION

Revenue

Total net revenue in 2022: 621 MDKK = ***90 million USD***





Research and development:
Around 35 million USD in approx. 300 R&D projects.

Commercial activities:
Around 55 million.

SEGES INNOVATION

Succes med Conservation Agriculture

- PAF 2021-2023

Promilleafgiftsfonden for landbrug

SEGES INNOVATION

Purpose of the project

Optimization of CA so yields are maintained, and soil health improves

- **WP1:** National trials with different establishment methods in CA cultivation.
- **WP2:** Targeted crop protection in CA.
- **WP3:** Optimization of fertilization and liming strategy in CA.
- **WP4:** Development of the economy at transition to CA.
- **WP5:** Dissemination and exchange of experience between farmers and advisors.

SEGES INNOVATION

GRObund – testing of cultivation systems

Objectives

- To investigate whether CA is a more sustainable form of cultivation
- To uncover effects on soil health
- Testing 'new ways'
- To provide a *platform for research and testing*

syngenta

SEGES INNOVATION

GRObund – Field Day – Birkelse 13th June 2022

SEGES INNOVATION

GRObund: 3 fantastic test areas and hosts

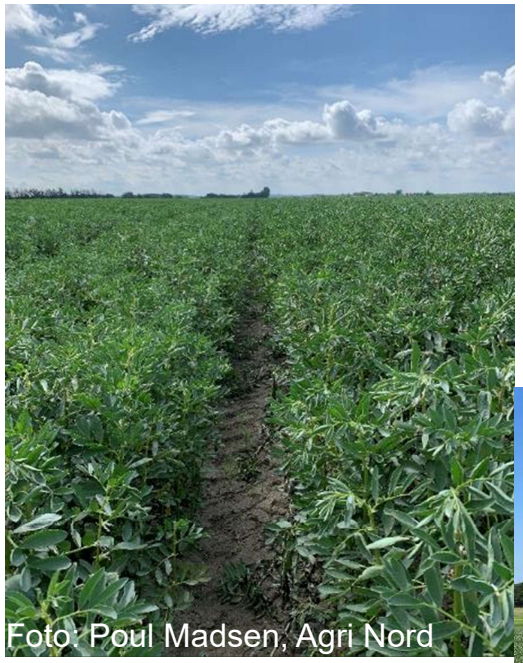


Foto: Poul Madsen, Agri Nord

JSJ Agro, Birkelse


Foto: Syngenta

Halgaard, Holstebro

Foto: Syngenta


Foto: Annette

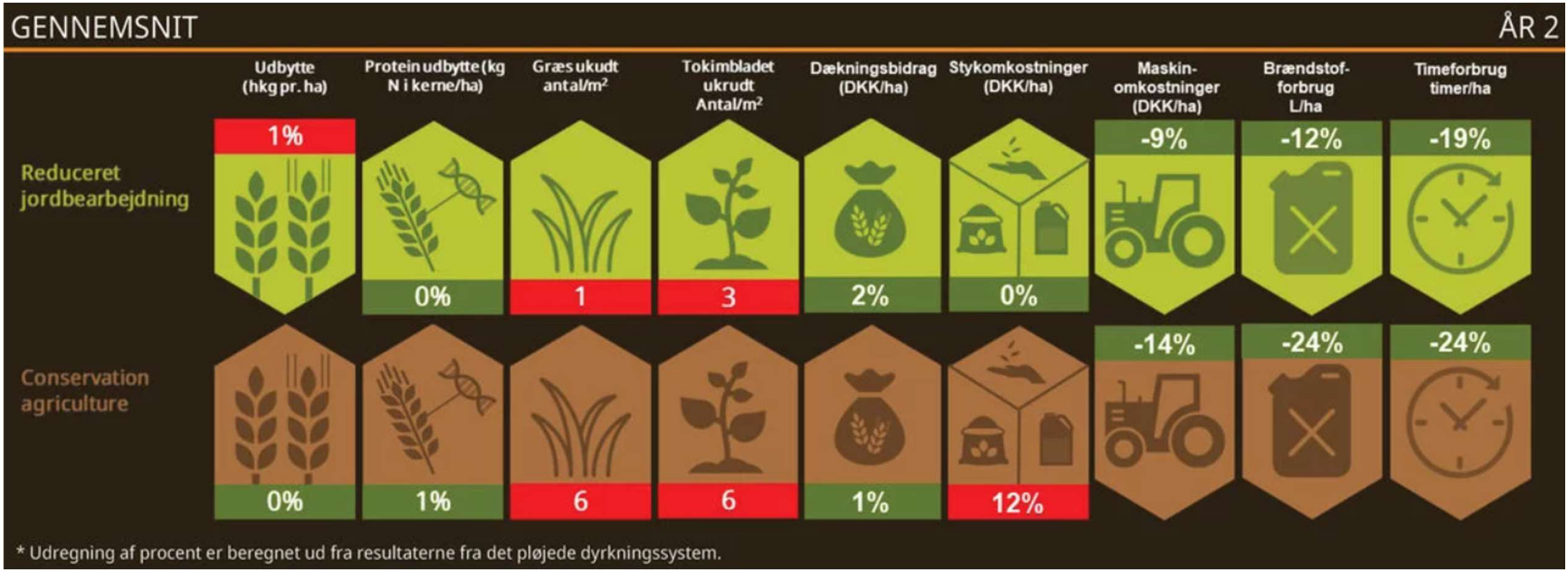

Foto: Annette

Simon Christensen Rødkildegaarden, Slagelse


Foto: Syngenta

SEGES INNOVATION

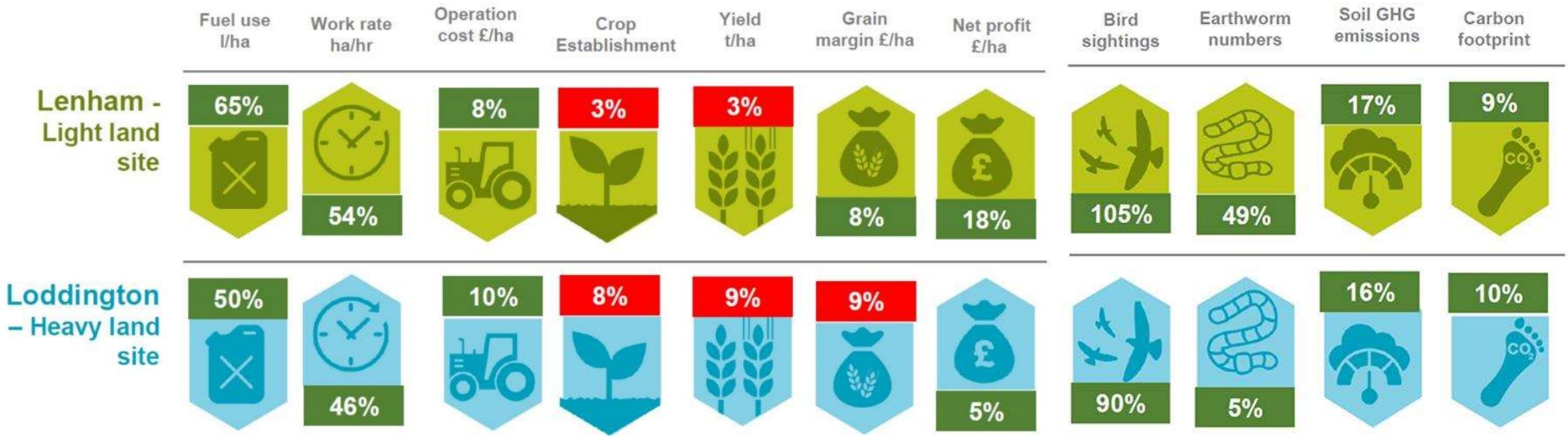
Syngenta key figures for 2022 in DK – winter wheat



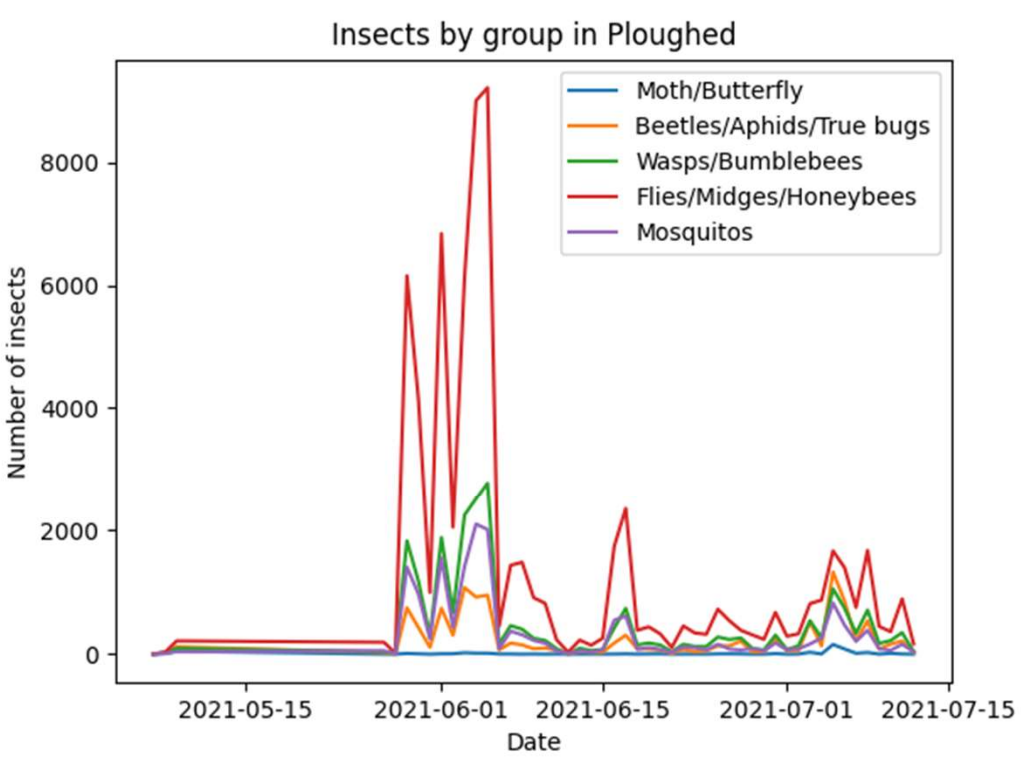
syngenta

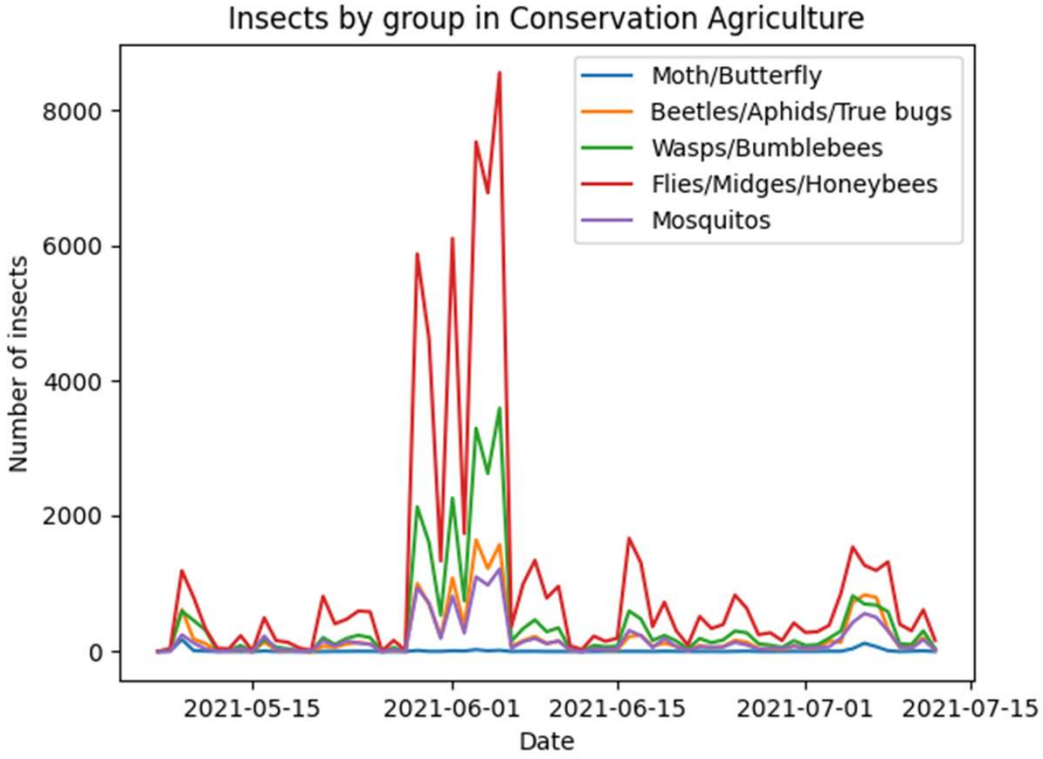
SEGES INNOVATION

Syngenta and CA – International results
Syngenta Sustainable Farming Initiative (2020 data)



Insects by groups



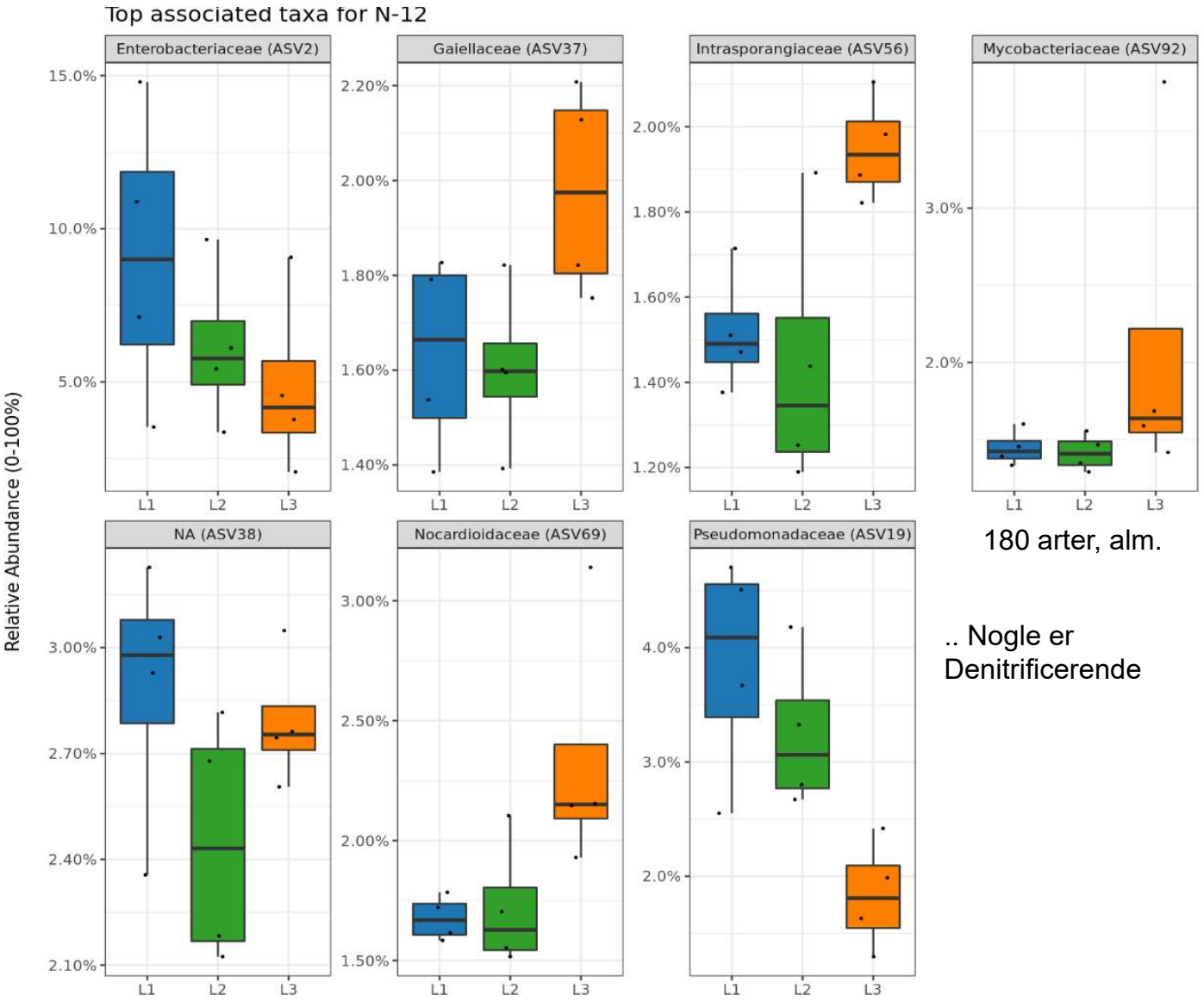


Microbiology

Ploughed

Reduced tillage

CA

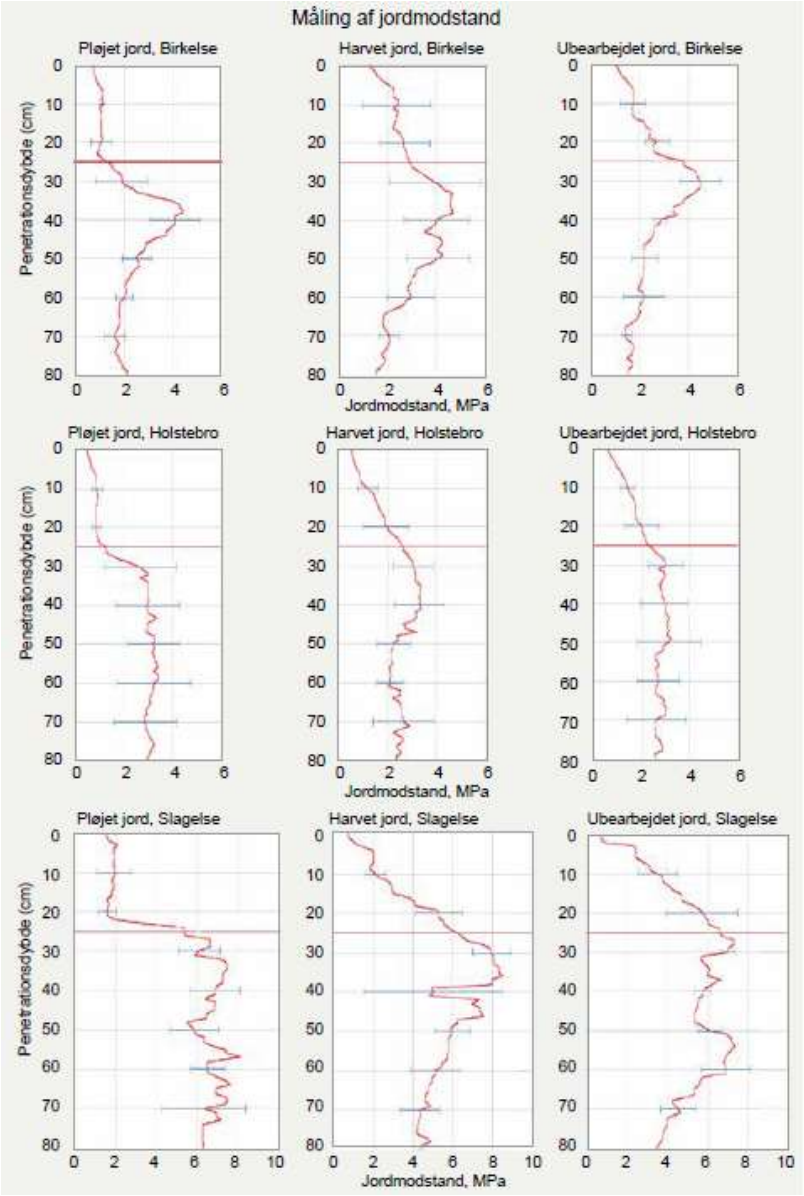


180 arter, alm.

.. Nogle er Denitrificerende

Field N-12
P-value < 0.2 selected for illustration.

Measurement of soil compaction (year 2)



SEGES INNOVATION

Org

AGROINTELLI

AARHUS UNIVERSITY

UNIVERSITY OF COPENHAGEN

FR DK

DAL-BO

ØKOLOGISK landsforening

CARBON FARM

Sustainable cropping systems in plant production

Ministry of Food, Agriculture and Fisheries of Denmark

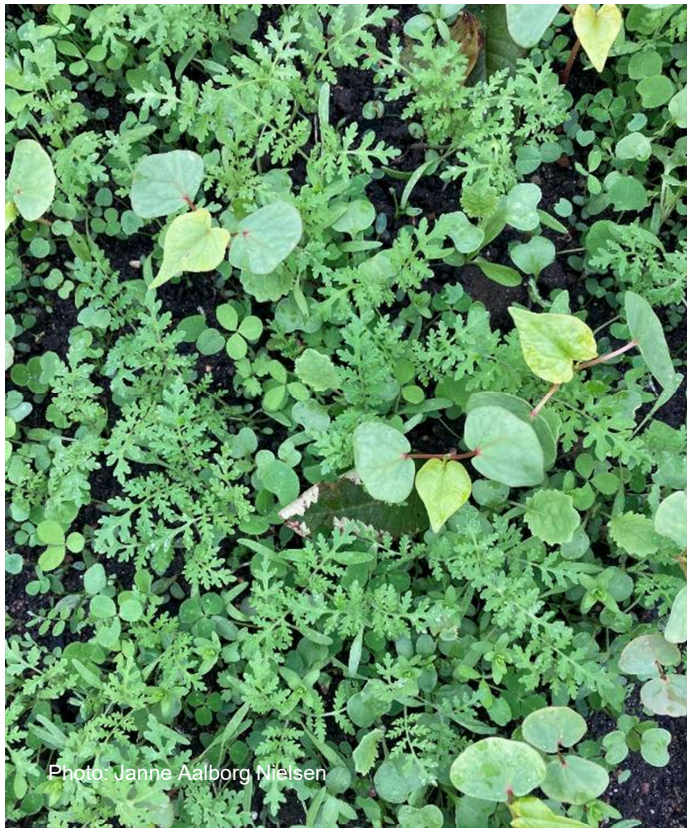
gudp

ØKOLOGISK landsforening

EGES
IOVATION

Organic no till, the holy grail?

- Diverse covercrop mixtures to control weeds



Winter kill

Photo: Janne Aalborg Nielsen

SEGES INNOVATION

Micro clover between rows
Row mowing

Innovation Centre for Organic Farming

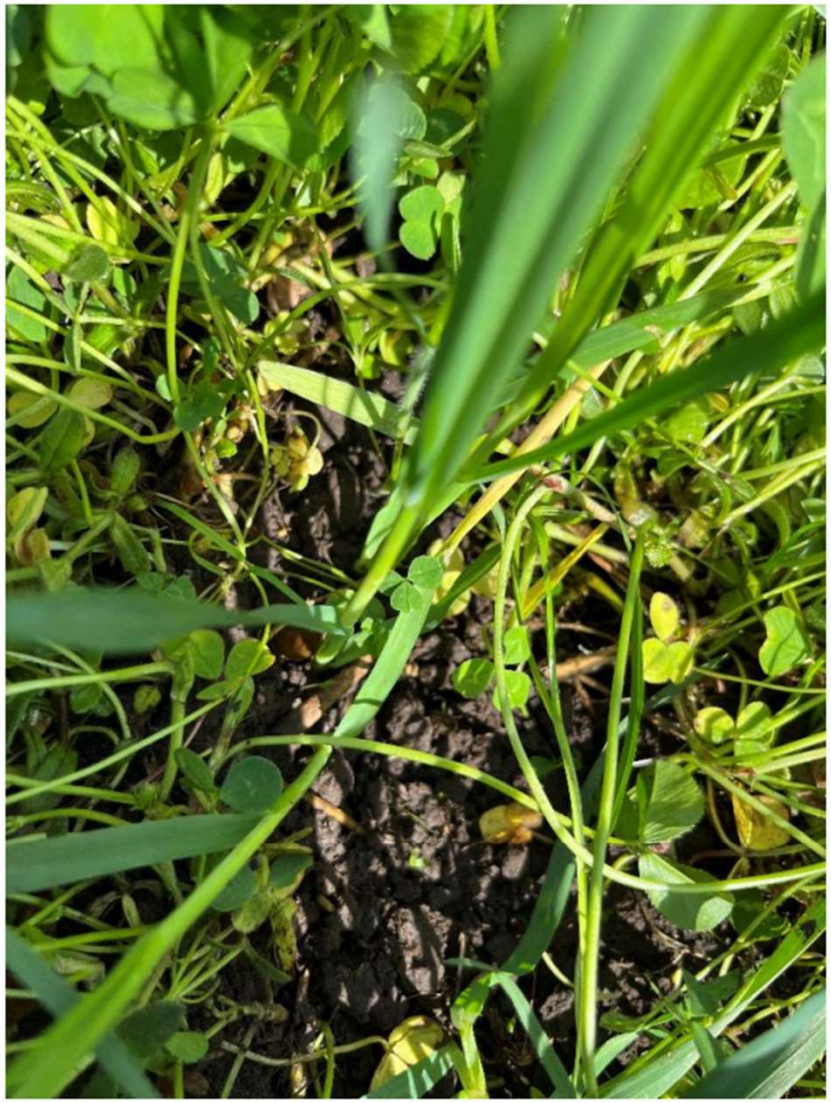
Ministry of Food, Agriculture and Fisheries of Denmark

gudp

SEGES INNOVATION

Row mowing

Maj

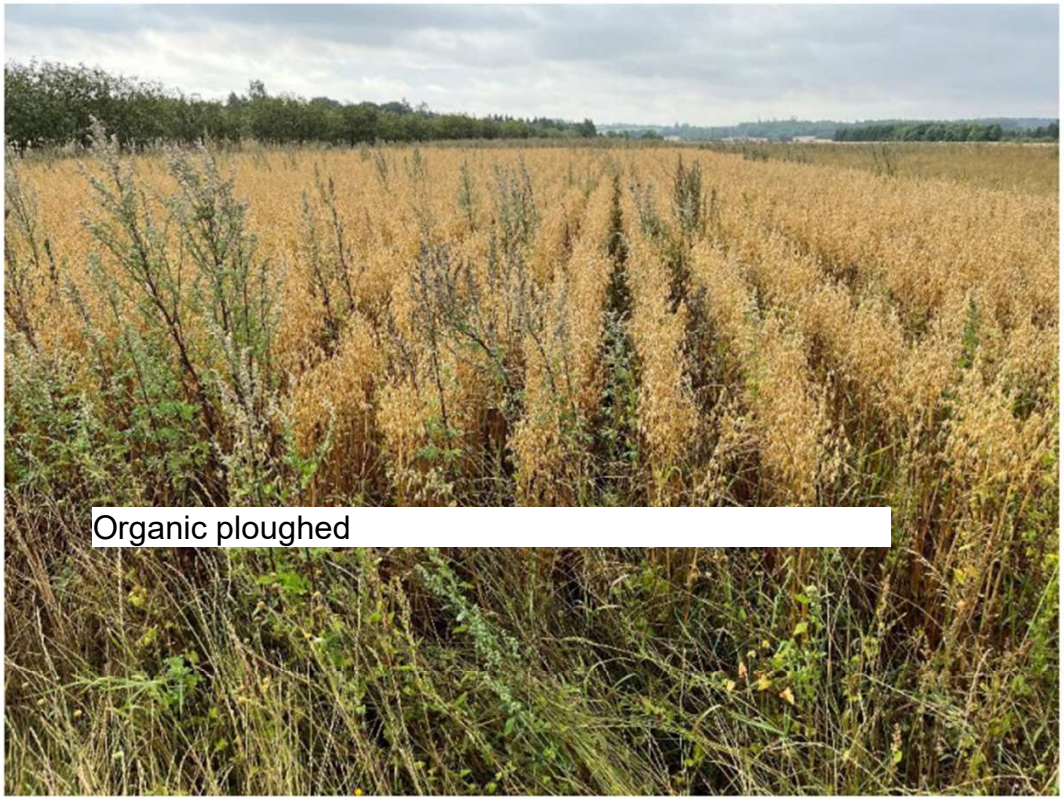


Innovationscen
for Økologisk Landbrug

June

Innovationscenter
for Økologisk Landbrug

Harvest



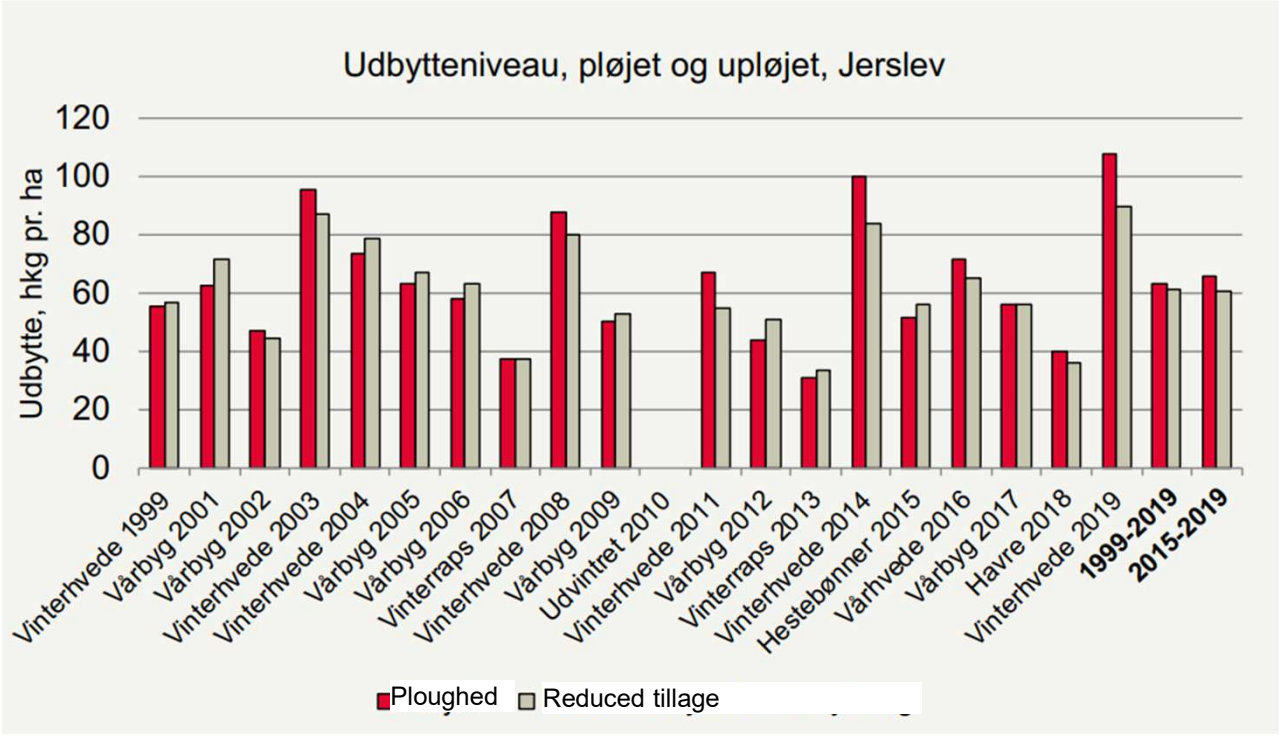
Innovationscenter
for Økologisk Landbrug

Not much succes yet, but the microclover has effect on minimizing the weeds

CarbonFarm field trial organic no till, replication 1 and 2 (out of four)

SEGES INNOVATION

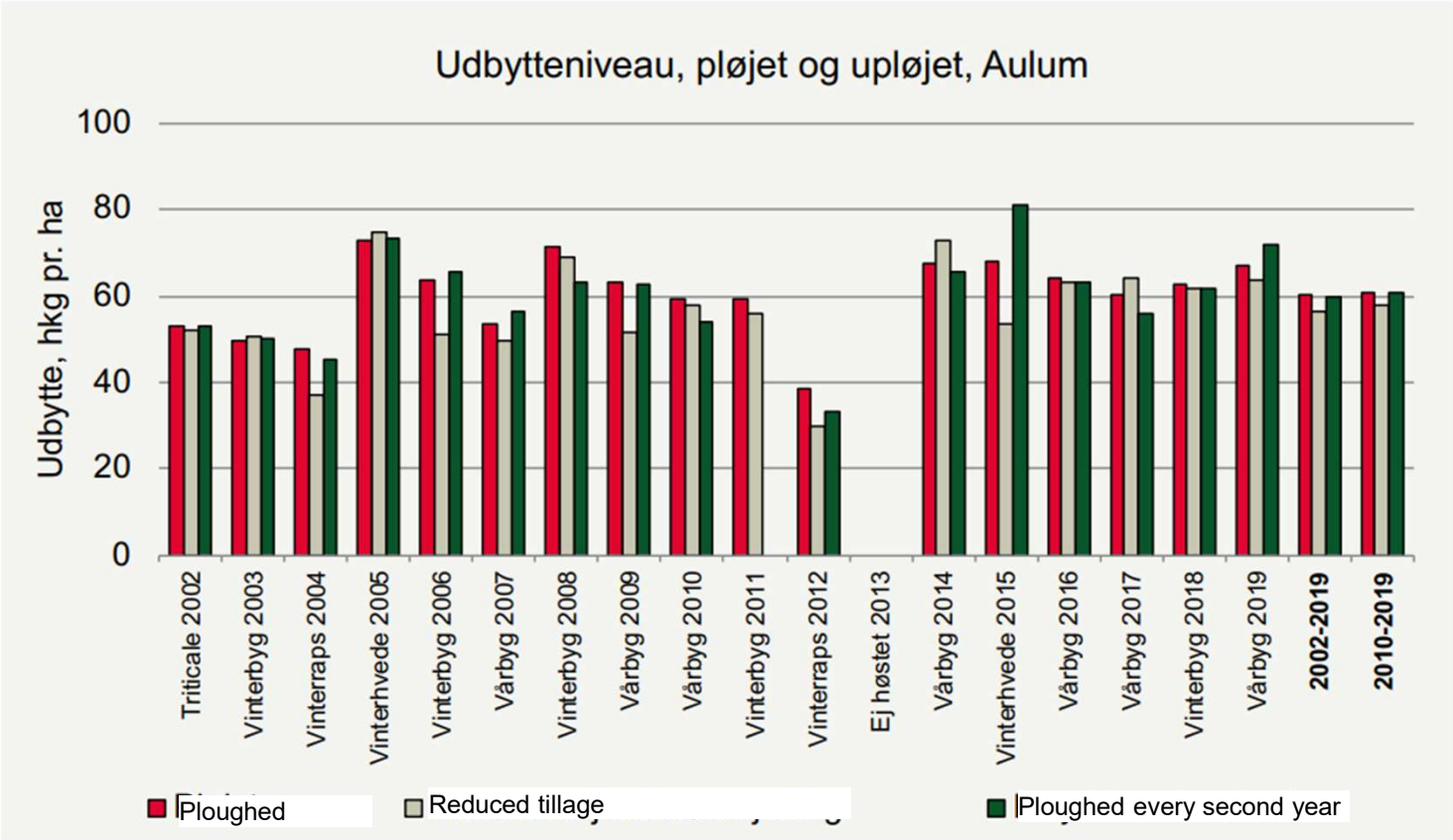
Long term field plots in Denmark 1999-2022, location 1
With and without plough



FIGUR 1. Udbytteniveau i Jerslev over tid. pløjet i forhold til reduceret jordbearbejdning/direkte såning.

National Danish Field Trials, 2019

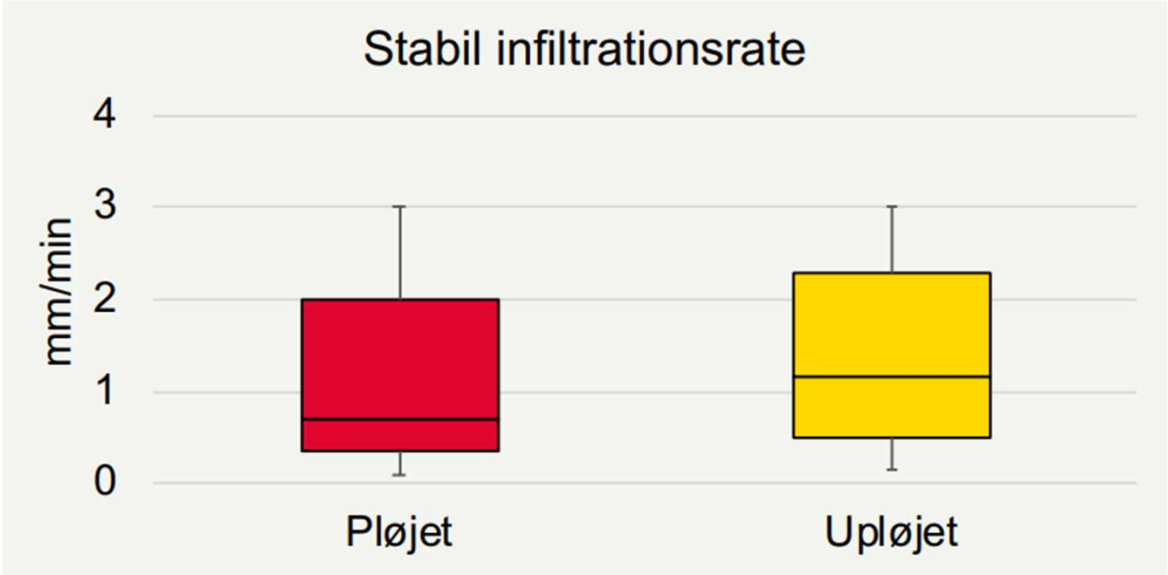
Long term field plots in Denmark 1999-2022, location 2



FIGUR 2. Udbytte niveau i Aulum over tid. Pløjet i forhold til reduceret jordbearbejdning og pløjning hvert andet år.

National Danish Field Trials, 2019

Infiltration rate location 1



FIGUR 3. Resultat af infiltrationstest i forsøget i Jerslev. Stregen i hver søjle viser medianen

National Danish Field Trials, 2019

Most of the measured infiltration rates in both ploughed and unploughed plots are within 0.2-2.5 mm/min, which are appropriate percolation rates for agricultural soil

SEGES INNOVATION

Photos: Janne Aalborg Nielsen

SEGES INNOVATION