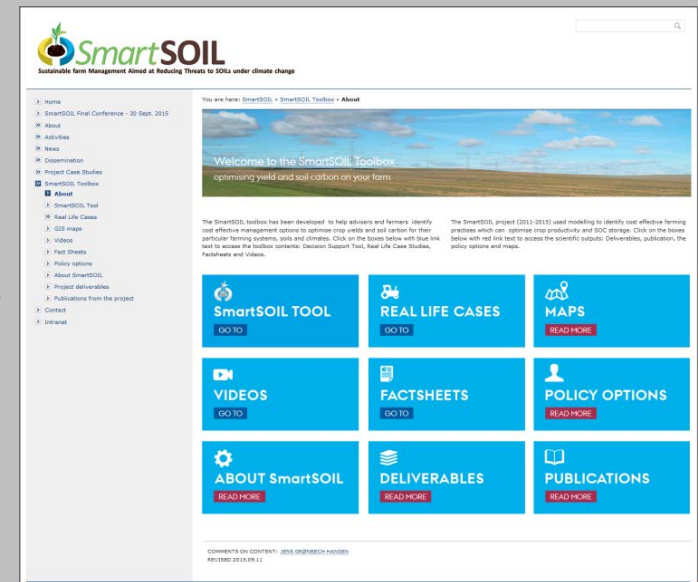
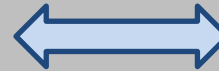


# The SmartSOIL Tool and Toolbox – demonstration

Jens Grønbech Hansen, Aarhus University & Sandra Naumann, Ecologic Institute



<http://smartsoil.eu/>

# The SmartSOIL Toolbox – Potential end-users

**Farming community  
(advisors, land  
manager/farmer)**

Real Life Cases, Videos,  
Factsheets, SmartSOIL Tool

**Policy makers at  
different scales**

Policy options,  
SmartSOIL Tool, Maps,  
Deliverables

**Researcher**

Publications,  
Deliverables

**Interested  
public**

All Tools

# The Toolbox - Factsheets

## Crop Rotation



### SmartSOIL

SmartSOIL FACTSHEET  
INCREASING SOIL ORGANIC MATTER  
THROUGH IMPROVED CROP ROTATION

#### What is it?

A crop rotation refers to the sequence of different crops on the same parcel over the course of several growing seasons. Improved crop rotation refers to a well-planned crop rotation system, such as alternating cereals and oilseed crops or cereals and legumes, or cereals and cover crops. These improved rotations can benefit soil by building soil organic matter, enhancing soil fertility and improving (direct and indirect) crop yields. Crop rotation can help maintain diversity in the soil microbiome and increase the water infiltration capacity of the soil. Improving crop rotation can also provide a range of benefits for managing and preventing weeds and diseases that build up over time due to continuous cropping of the same crop or pest/disease.

#### What are the benefits?

- Enhance the carbon sequestration and soil organic matter content of the soil. The soil microbiome is improved.
- Reduced risk of soil erosion and soil degradation.
- Reduced risk of soil erosion and soil degradation.
- Reduced risk of soil erosion and soil degradation.

#### Read it here

## Residue management



### SmartSOIL

SmartSOIL FACTSHEET  
RESIDUE MANAGEMENT: IMPROVING  
SOIL ORGANIC MATTER AND  
REDUCING SOIL EROSION

#### What is it?

Residue management refers to the way in which crop residues are managed after harvest. This includes the removal of crop residues from the field, the retention of crop residues in the field, and the use of crop residues for other purposes. Improved residue management can benefit soil by building soil organic matter, enhancing soil fertility and improving (direct and indirect) crop yields. Crop rotation can help maintain diversity in the soil microbiome and increase the water infiltration capacity of the soil. Improving crop rotation can also provide a range of benefits for managing and preventing weeds and diseases that build up over time due to continuous cropping of the same crop or pest/disease.

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- Enhance the carbon sequestration and soil organic matter content of the soil. The soil microbiome is improved.
- Reduced risk of soil erosion and soil degradation.
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#### Read it here

## Manure & compost



### SmartSOIL

SmartSOIL FACTSHEET  
RESIDUE MANAGEMENT: IMPROVING  
SOIL ORGANIC MATTER AND  
REDUCING SOIL EROSION

#### What is it?

Manure and compost are organic materials that can be used to improve soil fertility and structure. Manure is the waste product of livestock, and compost is the waste product of food and garden waste. Improved manure and compost management can benefit soil by building soil organic matter, enhancing soil fertility and improving (direct and indirect) crop yields. Crop rotation can help maintain diversity in the soil microbiome and increase the water infiltration capacity of the soil. Improving crop rotation can also provide a range of benefits for managing and preventing weeds and diseases that build up over time due to continuous cropping of the same crop or pest/disease.

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#### Read it here

## Cover & Catch crops



### SmartSOIL

SmartSOIL FACTSHEET  
BOOSTING ON-FARM SOIL ORGANIC MATTER  
WITH COVER/CATCH CROPS

#### What is it?

Cover and catch crops are crops that are grown between main crop cycles. Cover crops are grown to improve soil fertility and structure, and catch crops are grown to catch nutrients from the soil. Improved cover and catch crop management can benefit soil by building soil organic matter, enhancing soil fertility and improving (direct and indirect) crop yields. Crop rotation can help maintain diversity in the soil microbiome and increase the water infiltration capacity of the soil. Improving crop rotation can also provide a range of benefits for managing and preventing weeds and diseases that build up over time due to continuous cropping of the same crop or pest/disease.

#### What are the benefits?

- Enhance the carbon sequestration and soil organic matter content of the soil. The soil microbiome is improved.
- Reduced risk of soil erosion and soil degradation.
- Reduced risk of soil erosion and soil degradation.
- Reduced risk of soil erosion and soil degradation.

#### Read it here

## Conservation Agriculture



### SmartSOIL

SmartSOIL FACTSHEET  
CONSERVATION AGRICULTURE:  
BUILDING SOIL ORGANIC MATTER AND  
REDUCING PRODUCTION INPUTS

#### What is it?

Conservation agriculture is a set of practices that aim to reduce soil erosion and improve soil fertility and structure. It includes no-till, reduced tillage, and cover crops. Improved conservation agriculture management can benefit soil by building soil organic matter, enhancing soil fertility and improving (direct and indirect) crop yields. Crop rotation can help maintain diversity in the soil microbiome and increase the water infiltration capacity of the soil. Improving crop rotation can also provide a range of benefits for managing and preventing weeds and diseases that build up over time due to continuous cropping of the same crop or pest/disease.

#### What are the benefits?

- Enhance the carbon sequestration and soil organic matter content of the soil. The soil microbiome is improved.
- Reduced risk of soil erosion and soil degradation.
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#### Read it here

# The Toolbox – Real Life Case Studies

## HUNGARY

### Real Life Case, László Lévai, Kompolt, Hungary

Focus on adding manure, residue management and minimising tillage operations through subsoiling



Location of farm in Hungary



László Lévai who runs a 75ha arable farm in Kompolt

In Hungary SmartSOIL partner Andras Molnar spoke to László Lévai who runs a 75ha arable (winter wheat, rape, sunflowers) farm in Kompolt. The soil is loam with some sandy areas prone to drought and heat stress during summer. He applies manure and recycles crop residues in order to improve the soil structure. He also tries to minimise tillage operations to protect the soil, so when conditions he uses a subsoiler instead of a plough. These practices contribute to better soil functioning, which leads to better yields overall. For more details see below

### Video - Demonstrating on farm SmartSOIL practices in Hungary



This video demonstrates SmartSOIL practices on a farm in northern Hungary. We take a look at how László, a farmer in Kompolt, engages in smart soil practices to improve his soil. He uses both reduced tillage and residue management to keep his soil healthy. Watch to find out more.

### RLC - Hungary

**SmartSOIL**

**FOCUS ON ADDING MANURE, RESIDUE MANAGEMENT AND MINIMISING TILLAGE OPERATIONS THROUGH SUBSOILING**

**Name:** László Lévai  
**Region:** Kompolt, Hungary  
**Farm type:** Arable farming (winter wheat, rape, sunflowers)  
**Farm size:** 75ha

**What do you do on your farm?**  
I have done although I farmed with my father for many years and before that I worked at an agricultural research institute. I have 75 ha arable land, of which half is leased. Most of my parents are on loam soil, although I have a 10 ha sandy area which is prone to drought and heat stress during summer.

**What do you do to improve your soil?**  
I apply manure and recycle crop residues in order to improve the soil structure. I also try to minimise tillage operations to protect the soil, so when conditions permit I use a subsoiler instead of a plough. These practices contribute to better soil functioning, which leads to better yields overall.

**Why did you decide to implement this practice?**  
The soil was in poor health and there were negative effects on plant development, nutrient and water uptake, and in some circumstances due to high heat consumption for tillage and low yields.

**How have you implemented the practices into your subsoiling?**  
The use of the subsoiler is not introduced as a substitution but rather as a complement to ploughing. My usual rotation includes rape winter wheat summer wheat winter wheat (sunflower) I have winter wheat for more than one year. Based on my experience, the most important issue for subsoiling is proper timing. I carefully assess each and every situation, mainly the soil conditions but also costs and machinery availability. I apply manure every 4-5 years, depending on availability and my financial situation. For residue management, the residue is spread evenly on the ground and partly ploughed in but this depends on the harvester.

**What has been the biggest challenge? And how have you overcome it?**  
The most difficult challenge was the timing of subsoiling operations, that needs constant learning and adaptation. Harrows, having access to a wider range of tools is not easy for my farm size due to financial barriers. I overcame this by buying used machinery (or sometimes built my own) or using contractors. For manure spreading I use contractors.

- [Click here for English version](#)
- [Click here for Hungarian version](#)

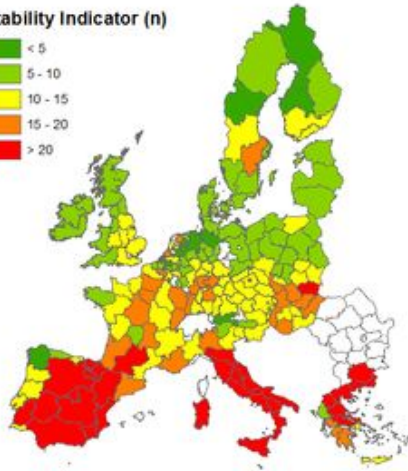
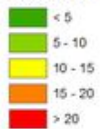
Case studies: Hungary, Denmark, Poland, Scotland, Italy and Spain



# The Toolbox – Soil risk maps

## Soil risk maps

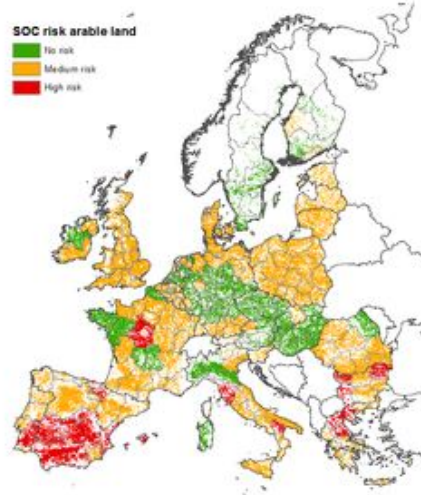
Stability Indicator (n)



Click on the map to enlarge

Soil potential stability map (Figure 4 from D2.4)

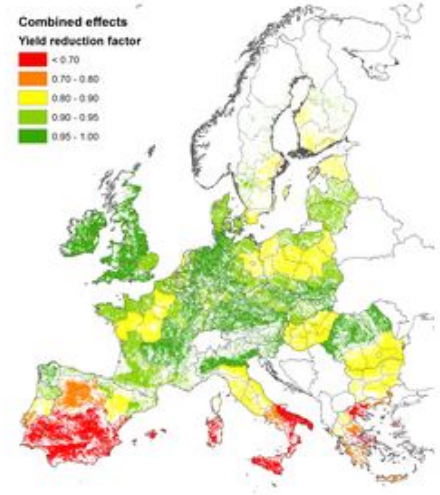
SOC risk arable land



Click on the map to enlarge

SOC risk map

Combined effects  
Yield reduction factor



Click on the map to enlarge

Yield reducing factors

# The Toolbox – Farmer videos

## SmartSOIL partners own videos

### SmartSOIL practices in Hungary



This video demonstrates SmartSOIL practices on a farm in northern Hungary. We take a look at how László, a farmer in Kompolt, engages in SmartSOIL soil practices to improve his soil. He uses both reduced tillage and residue management to keep his soil healthy. Watch to find out more.

### SmartSOIL practices in Italy



This video explores the farming practices of Andrea and Nunzio De Angeli. They run a 300ha mixed farm producing apples, peaches, potatoes and maize in Tuscany with both sandy and heavier clay soils, which are managed differently. Using the SmartSOIL practices of cover crops and no-till seeding within their rotations, Andrea and Nunzio aim to improve their soil organic matter. Check out the video for more details.

## Links to relevant videos from other sources

### Visualising carbon - no mean feat!



This animated film demonstrates the need to protect the long term carbon stored in soils and vegetation as well as reduce carbon emissions. It quite neatly gives you a sense of the quantities of carbon in our atmosphere and soils. [Read more...](#)

3 min.

### Carbon Accounting for farmers



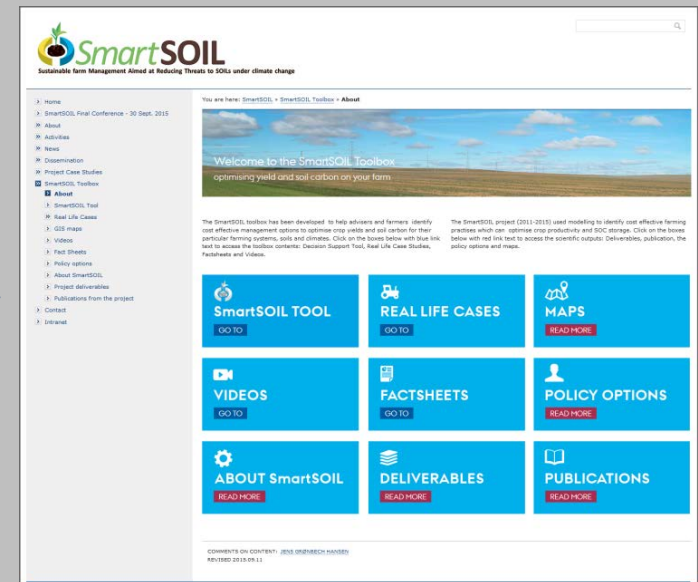
Farming Futures has created this short film to explain the benefits of using carbon calculators on your farm. Henry Aubrey Fletcher, CLA president and dairy farmer, takes us through his journey using the CLA CALM Calculator and how it helped him identify areas for improvement and efficiency savings on his farm. [Read more...](#)

5 min.

# How to access the Toolbox?

<http://smartsoil.eu/>

# The SmartSOIL Tool and Toolbox



<http://smartsoil.eu/>



The logo features a stylized globe with a green plant sprout growing from the top, enclosed within a circular arrow.

# SmartSOIL Tool

Welcome to SmartSOIL Tool

The SmartSOIL tool enables you to explore changes in soil carbon, crop yield and economics due to changes in cropping management

Select your language using the flags and press the start button

Start now



About the tool



Get additional information



The SmartSOIL project received funding from the European Union's 7th Framework Programme for research, technological development and demonstration under grant agreement no 289694



**SmartSOIL**

Sustainable farm Management Aimed at Reducing Threats to SOILs under climate change

Web site provided by Aarhus University, Faculty of Science and Technology, Department of Agroecology.  
Report technical problems to webmaster: [Margit S. Jørgensen](mailto:Margit.S.Jorgensen). Optimized for screen size 1280x800

[smartsoil.eu/tool](http://smartsoil.eu/tool)

We listened to our stakeholders and developed a web-based tool that is:

- good
- simple
- user-friendly
- evidence based

<b>Step 1:</b> Location	<b>Step 2:</b> Typical field	<b>Step 3:</b> Potential management options	<b>Step 4:</b> Overview scenarios	<b>Step 5:</b> Costs and benefits and farmers' experiences
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Please select one of the management options listed below to get further information about its costs and benefits, cost-effectiveness and read about other farmers' experiences.

Option 1: [Crop rotation](#)

Option 2: [Residue management](#)

Option 3: [Adding manure or compost](#)

Option 4: [Cover crops/catch crops](#)

Option 5: [Conservation agriculture](#) (reduced tillage, residue management and cover crops)

**Disclaimer:** Much of the economic data is context specific and the estimated impacts have been applied across a range of countries and crops. Therefore, the estimates can only be considered as being indicative. Estimates for a wide range of countries are presented; users can find examples which are comparable to their geographical location.

### Option 1: Crop rotation

**Find out more about  
benefits and costs**

**Find out more about  
cost-effectiveness**

**Experiences from  
other farmers**

**Read the factsheet**

 **About the tool**

 **Get additional information**  
(from the SmartSOIL toolbox)

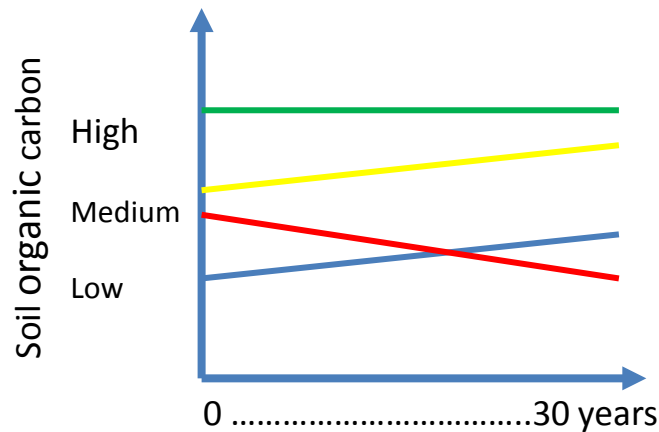
 **Select your language**



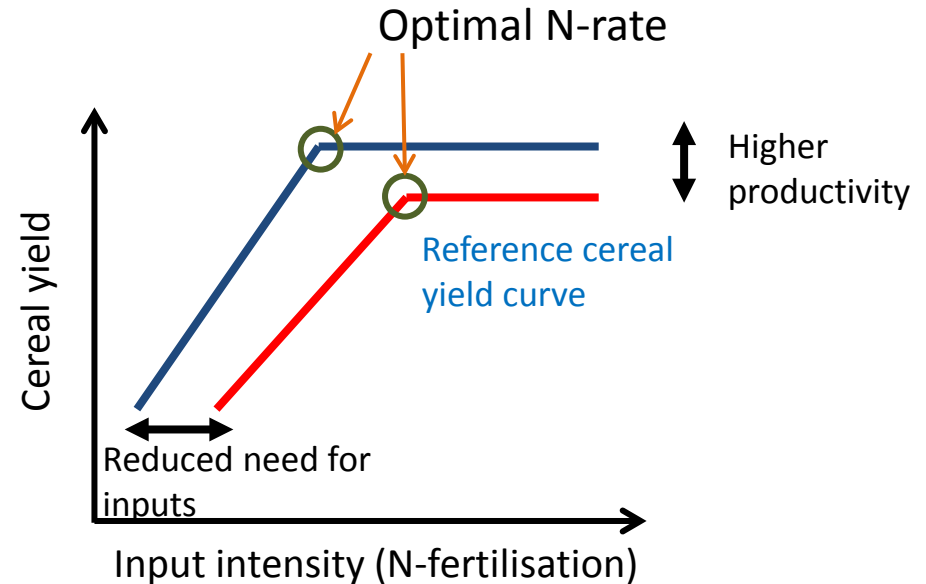
This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 289694.

# SmartSOIL Tool concept

C-Tool, Carbon sequestration

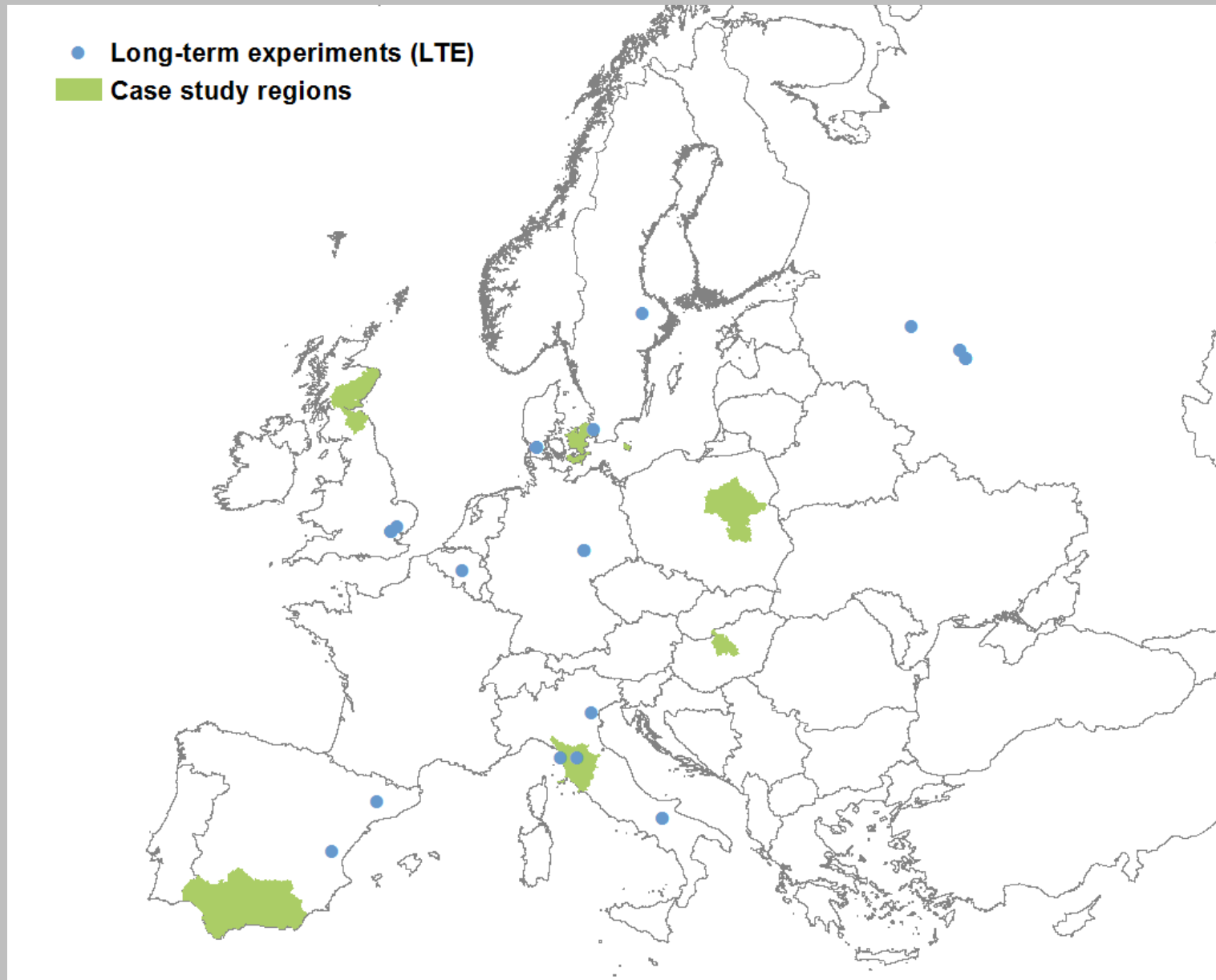


Simple model output



The integration of a SOC model and a yield model is NEW!!

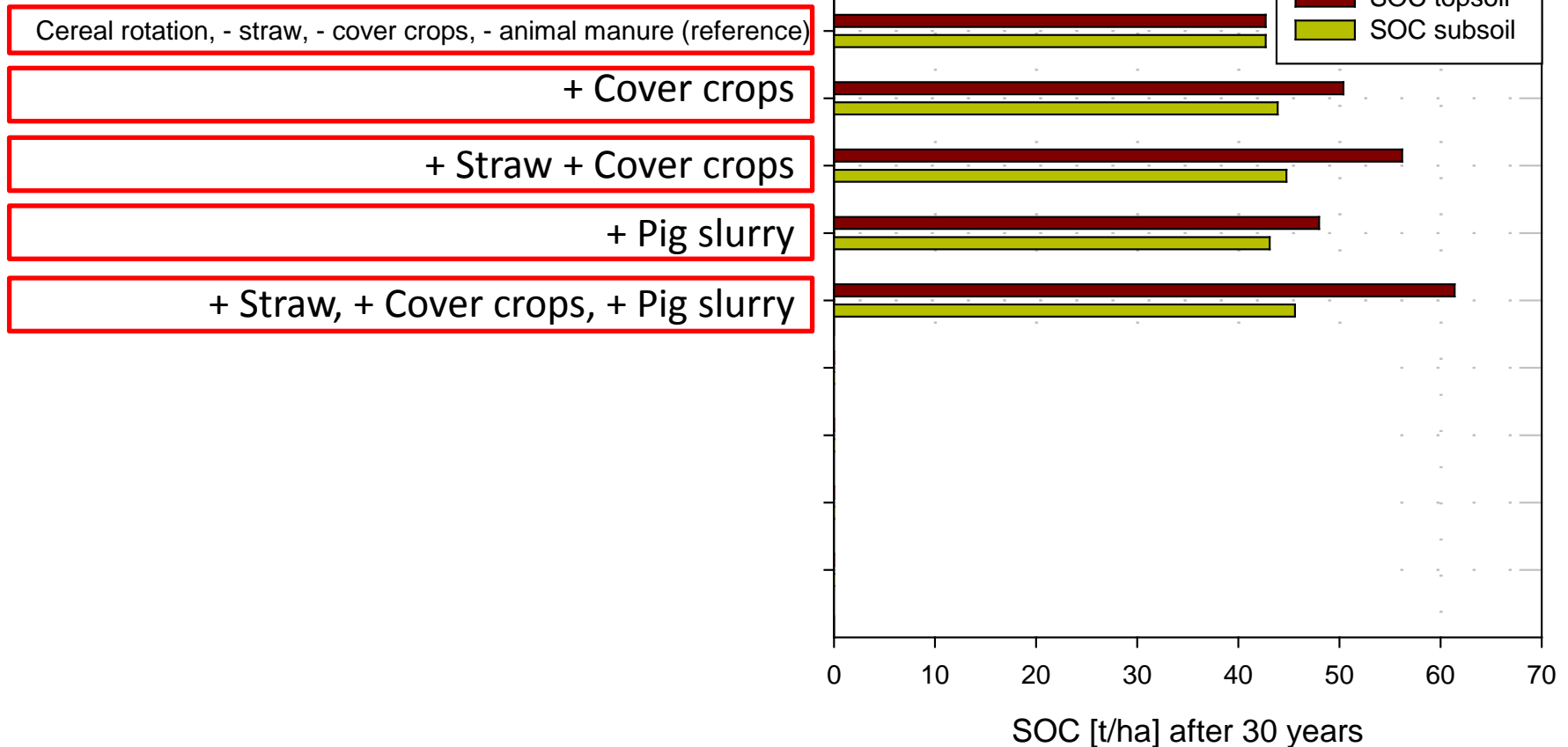
# Case study regions – Locations



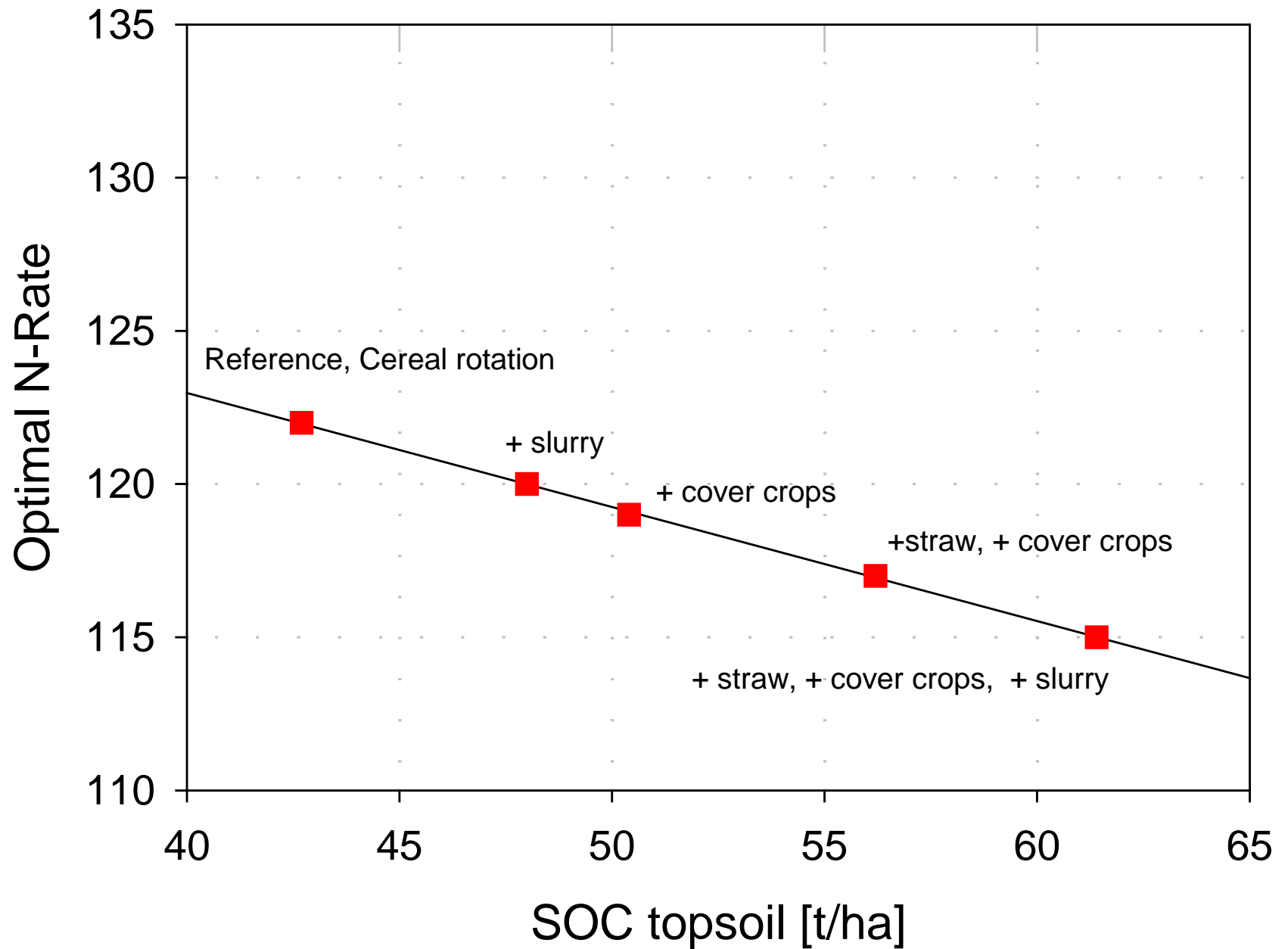


# Carbon sequestration in standard scenarios

Denmark (Initial SOC = 1.1%)



Denmark Initial SOC = 1.1 %



# Opportunities for wider application/transfer of the SmartSOIL Tool and Toolbox

- How to integrate the SmartSOIL Tool and Toolbox in a local context?
- What tools and services do farmers use to inform themselves about soil quality management?
- What are the pre-conditions for using the SmartSOIL Tool in different countries / regions?
- Make it a part of a learning process for advisors/farmers networks

# Thanks to all partners who contributed to this

## Well done!

