Slim Landgebruik

Soil C tool

Carbon Farming Conference

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Soil C tool

Tool for:

- arable farmers, land-bound livestock farmers (e.g., dairy farmers)
- agricultural advisors/accountants, (agricultural) education

Tool to assess:

- carbon in- and outputs
- carbon balance on parcel and farm level
- CO_2 sequestration on parcel and farm level
- change in soil carbon content over time
- the effect of carbon measures

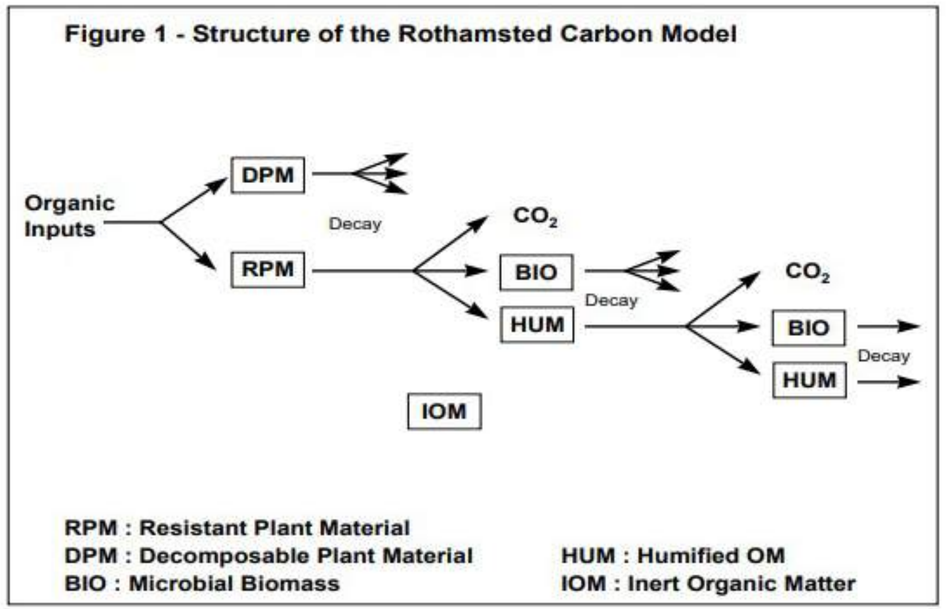
Why a Practical Soil C tool?

- Farmers indicated the need for a tool to assess the impact of C measures.
- Stimulate the implementation of C measures:
    - Farmer will not invest in C measures if it is unknown what the effect is
    - Effect and decision C measures are situation/farm specific
- Changes in C stock are difficult to measure in the field
- Help reaching the climate goal: 0.5 Mton CO_2-eq per year extra carbon sequestration in Dutch mineral agricultural soils from 2030 onwards

Model core: RothC model

- Dynamic model for the turnover of OC in the topsoil
- Globally and scientifically acknowledged
- Validated on long-term experiments
- Mineral soils only
- Turnover of OC depends on T, prec., evaporation, clay content and soil cover
- Input data: soil data, climate data, yields, organic fertilisers, crop management

RothC is also used for the national monitoring



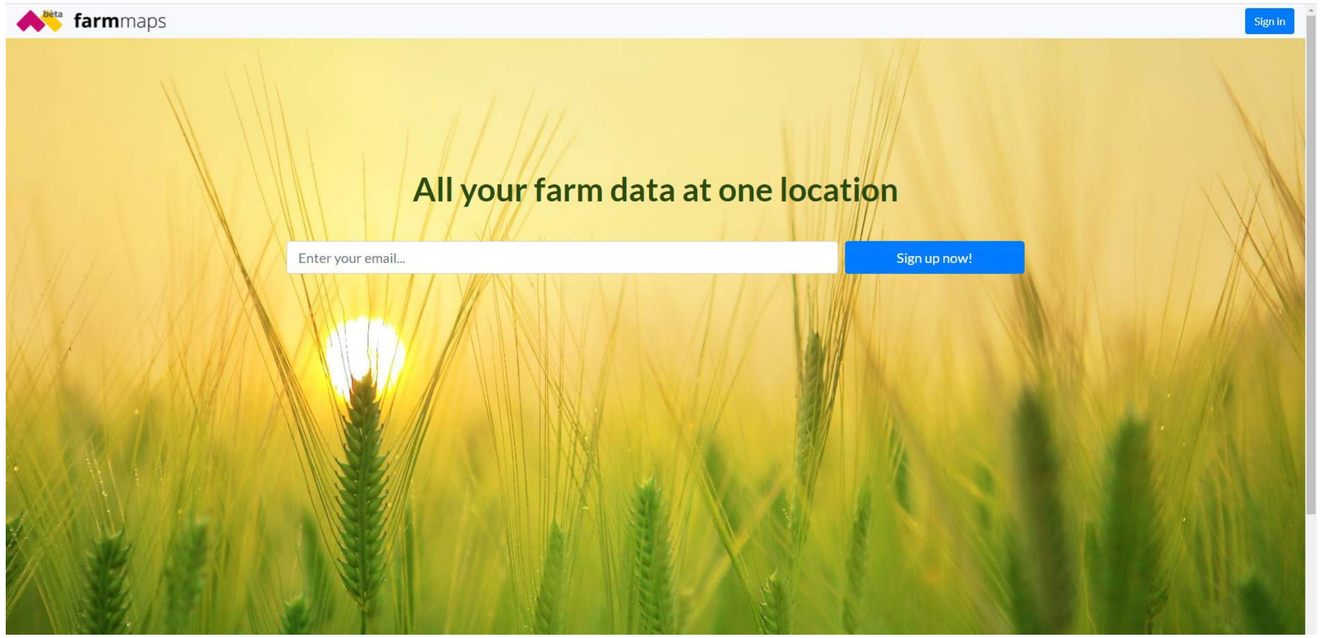
Coleman and Jenkinson, 2014

Interface: application in FarmMaps

Platform FarmMaps

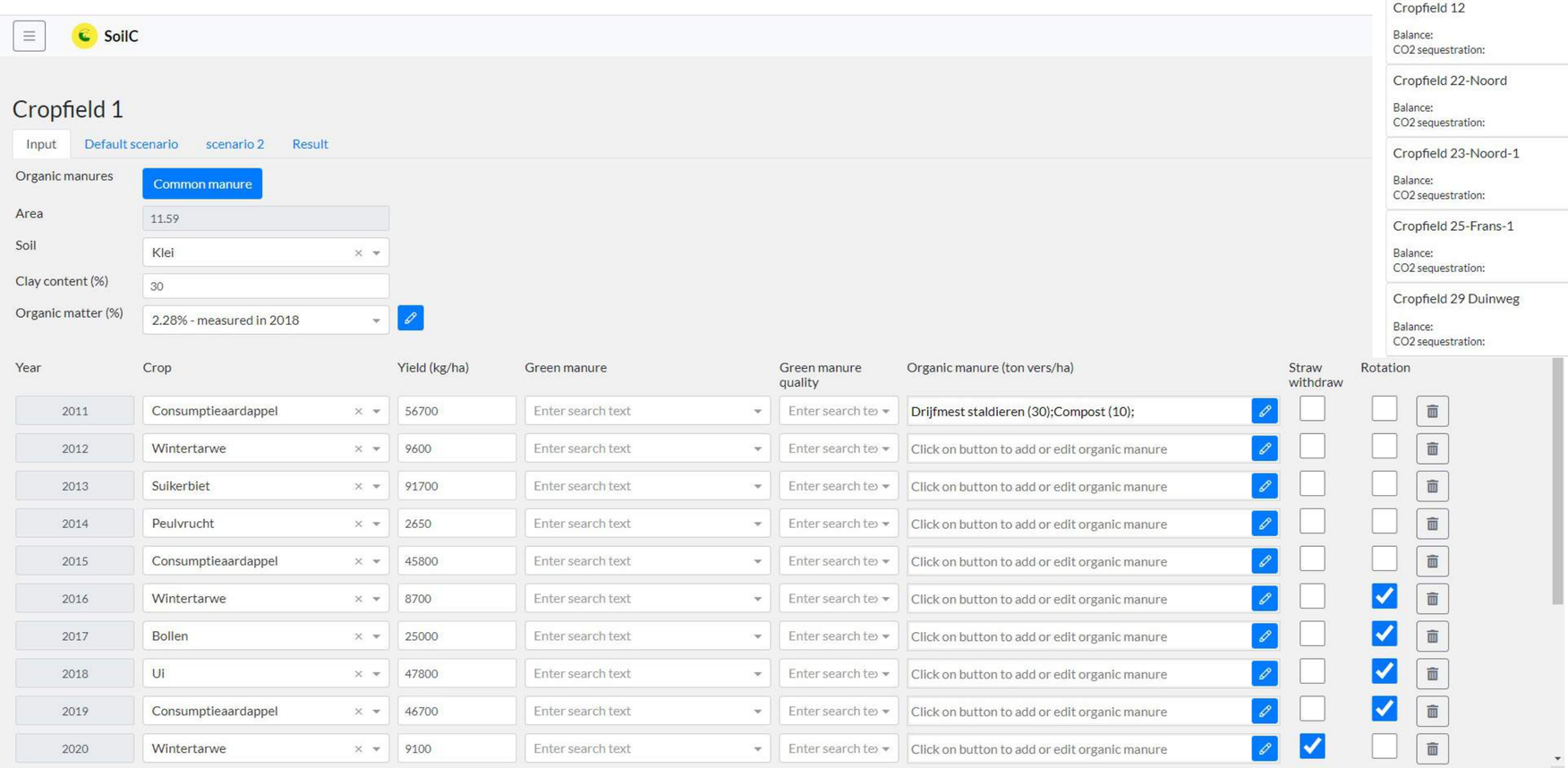
- Other application besides Soil C tool.
- Available input data (e.g., crop history, crop yield) are automatically linked.
- Data privacy guaranteed (data can only be shared after permission)
- Launched at FarmMaps: end of 2021 or early 2022

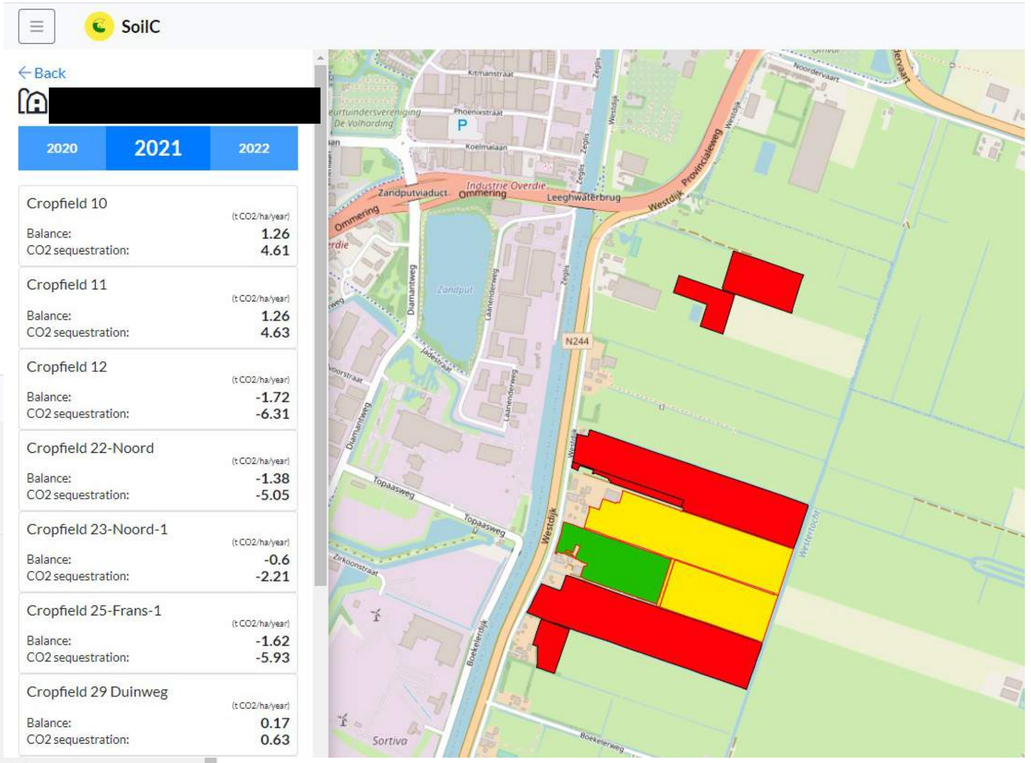
https://farmmaps.eu/en/

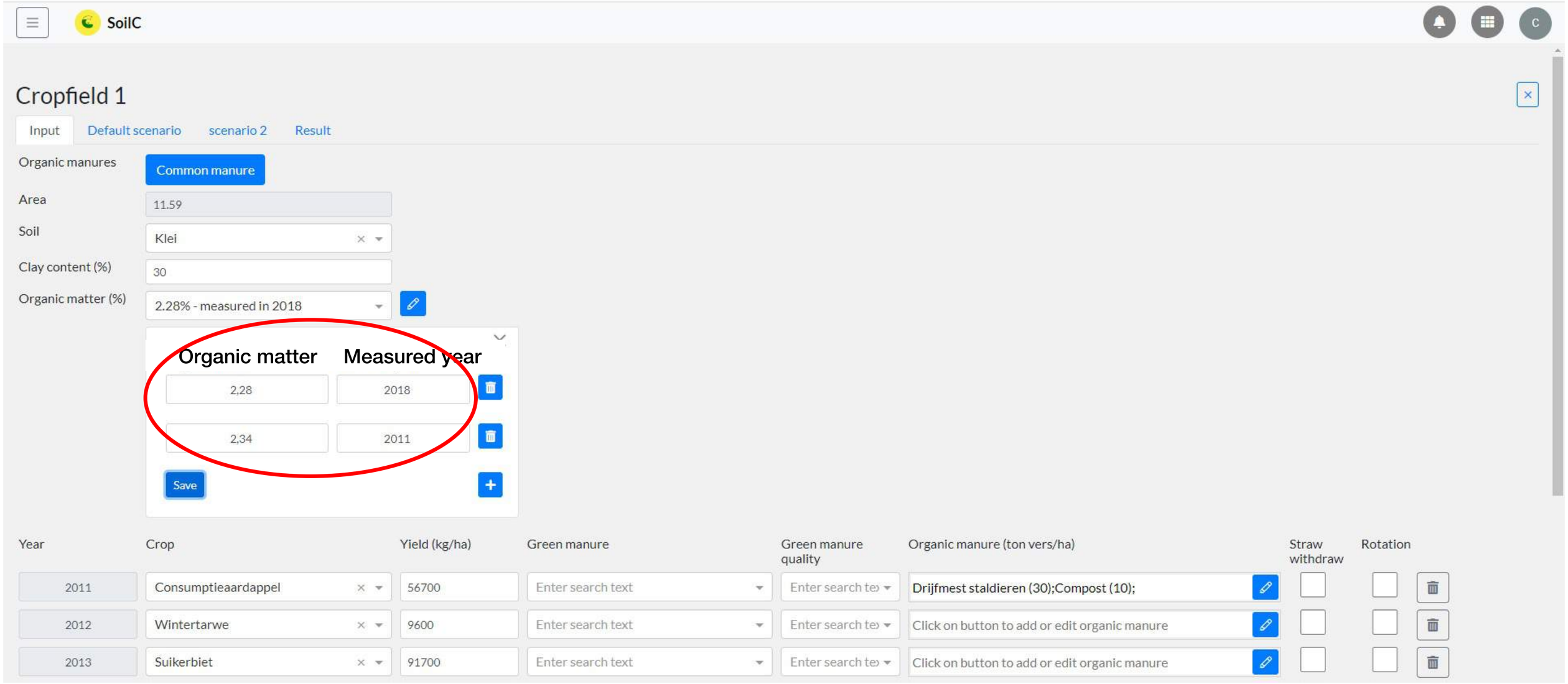


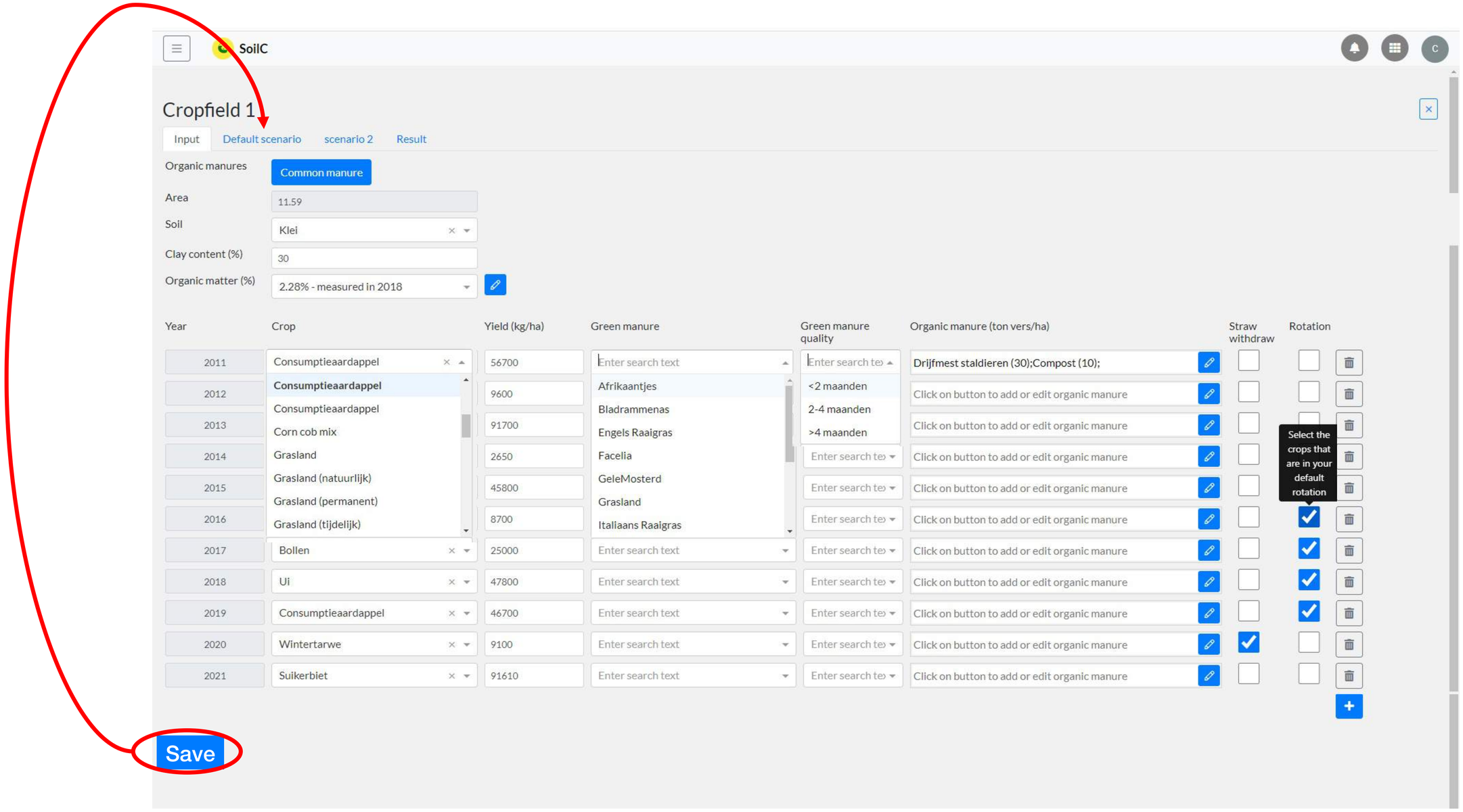
Interface

1. Create your farm
2. Go to the tool and fill in the required information






SoilC
Cropfield 1
Input
Default scenario
scenario 2
Result
Organic manures
Common manure
Area
11.59
Soil
Klei
Clay content (%)
30
Organic matter (%)
2.28% - measured in 2018
Organic matter
Measured year
2,28
2018
2,34
2011
Save
Year
Crop
Yield (kg/ha)
Green manure
Green manure quality
Organic manure (ton vers/ha)
Straw withdraw
Rotation
2011
Consumptieaardappel
56700
Drijfmest staldieren (30);Compost (10);
2012
Wintertarwe
9600
Click on button to add or edit organic manure
2013
Suikerbiet
91700
Click on button to add or edit organic manure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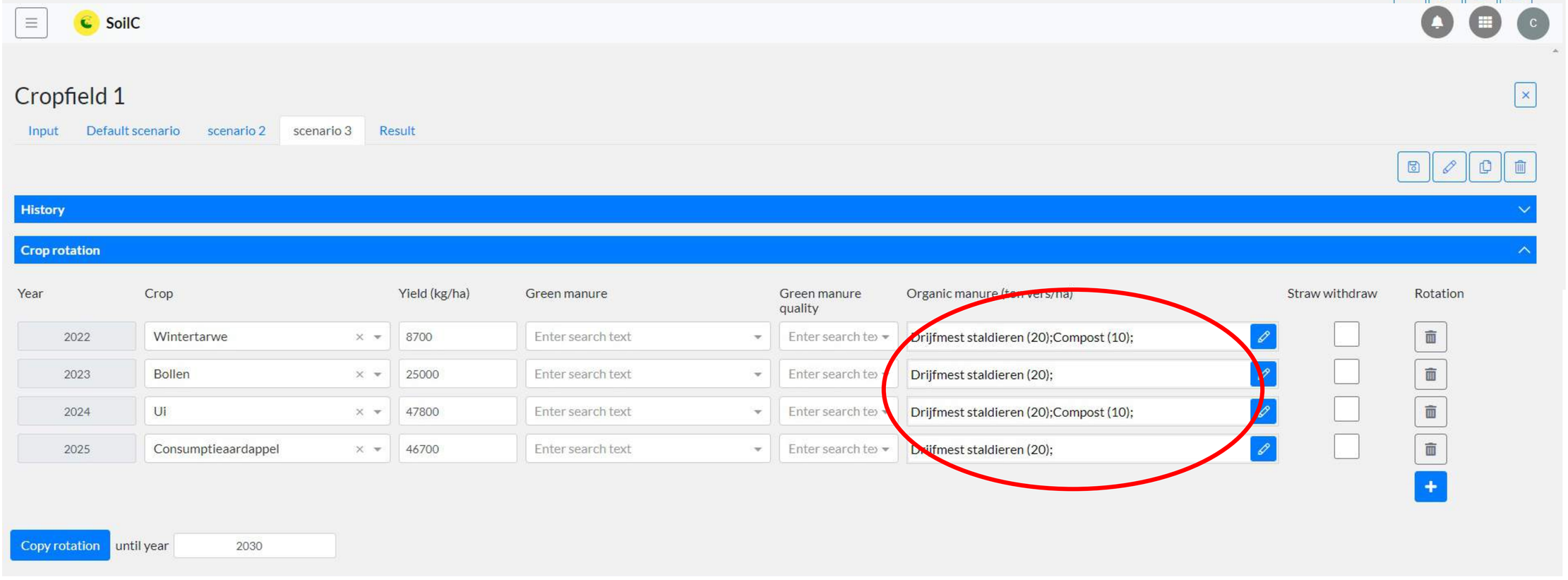
Rotation
2011
Consumptieaardappel
56700
Drijfmest staldieren (30);Compost (10);
Consumptieaardappel
Consumptieaardappel
Corn cob mix
Grasland
Grasland (natuurlijk)
Grasland (permanent)
Grasland (tijdelijk)
Afrikaantjes
Bladrammenas
Engels Raaigras
Facelia
GeleMosterd
Grasland
Italiaans Raaigras
<2 maanden
2-4 maanden
>4 maanden
2012
9600
Click on button to add or edit organic manure
2013
91700
2014
2650
2015
45800
2016
8700
2017
Bollen
25000
2018
Ui
47800
2019
Consumptieaardappel
46700
2020
Wintertarwe
9100
2021
Suikerbiet
91610
Enter search text
Select the crops that are in your default rotation
Save


SoilC
Cropfield 1
Input
Default scenario
scenario 2
Result


SoilC
Cropfield 1
Input
Default scenario
scenario 2
Result


SoilC
Cropfield 1
Input
Default scenario
scenario 2
scenario 3
Result
History
Crop rotation
Year
Crop
Yield (kg/ha)
Green manure
Green manure quality
Organic manure (ton vers/ha)
Straw withdraw
Rotation
2022
Wintertarwe
8700
Enter search text
Drijfmest staldieren (20);Compost (10);
2023
Bollen
25000
Drijfmest staldieren (20);
2024
Ui
47800
Drijfmest staldieren (20);Compost (10);
2025
Consumptieaardappel
46700
Drijfmest staldieren (20);
Copy rotation
until year
2030

SoilC

Cropfield 1

Input | Default scenario | scenario 2 | scenario 3 | Result

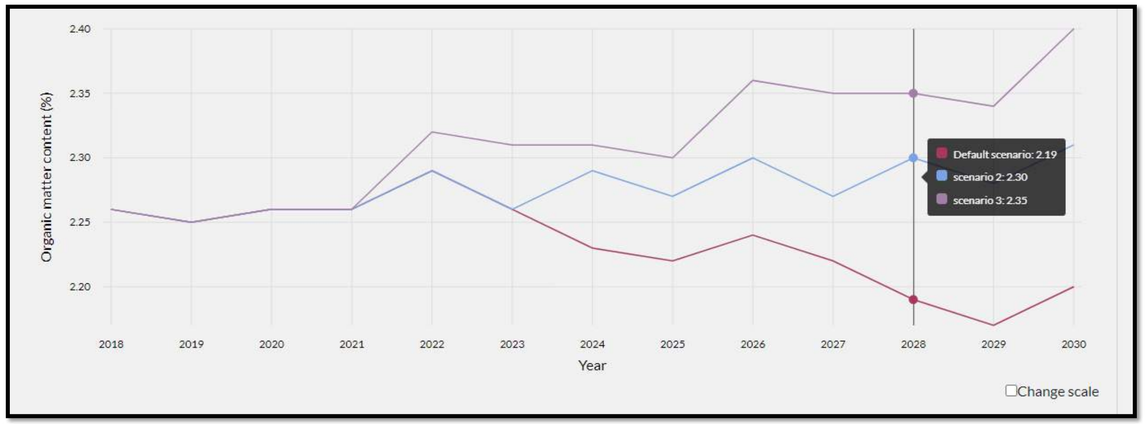
Download

Legend
- Organic manure
- Compost
- Crop residues
- Green manure
- Release

Compare scenario Default scenario with scenario 3 | Default scen... | scenario 2 | scenario 3

		CO2 sequestration (t C	Carbon balance (t C/ha/year)
	2011 - 2021	-0.31	-0.08
Default scenario	2022 - 2030	-0.44	-0.12
scenario 2	2022 - 2030	0.37	0.10
scenario 3	2022 - 2030	1.04	0.28

Slim Landgebruik



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Show farm result

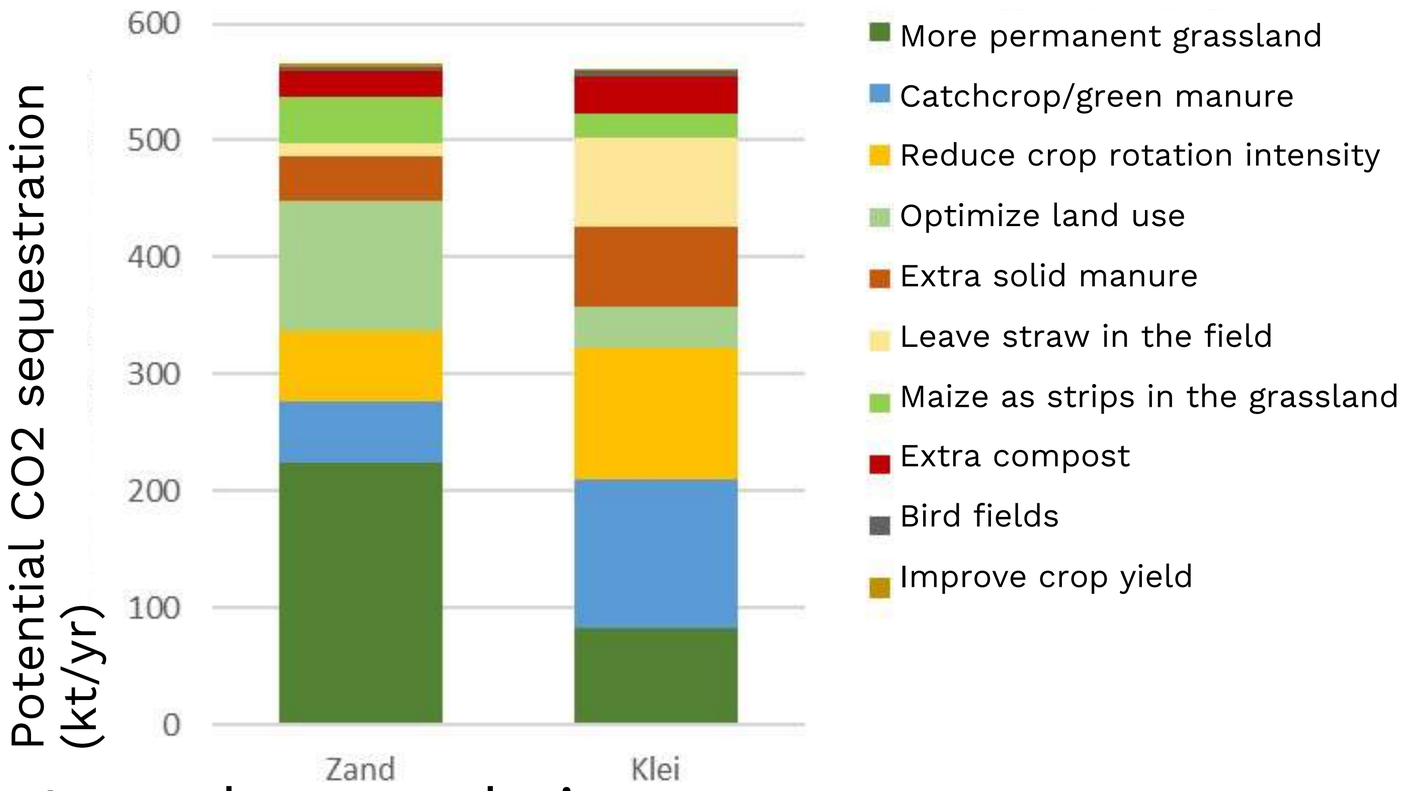
C measures

- Extra solid manure (manure for export is processed)
- Reduce crop rotation intensity
- Catchcrop/green manure
- Extra compost
- Leave straw in the field
- Improve crop yield
- Optimize land use (60% permanent grassland, 20% temporary grassland, 20% fo maize)
- More permanent grassland (40% temporary grassland and maize will turn into permanent grassland)
- Maize as strips in the grassland
- Field edges
- Bird fields

Not included:

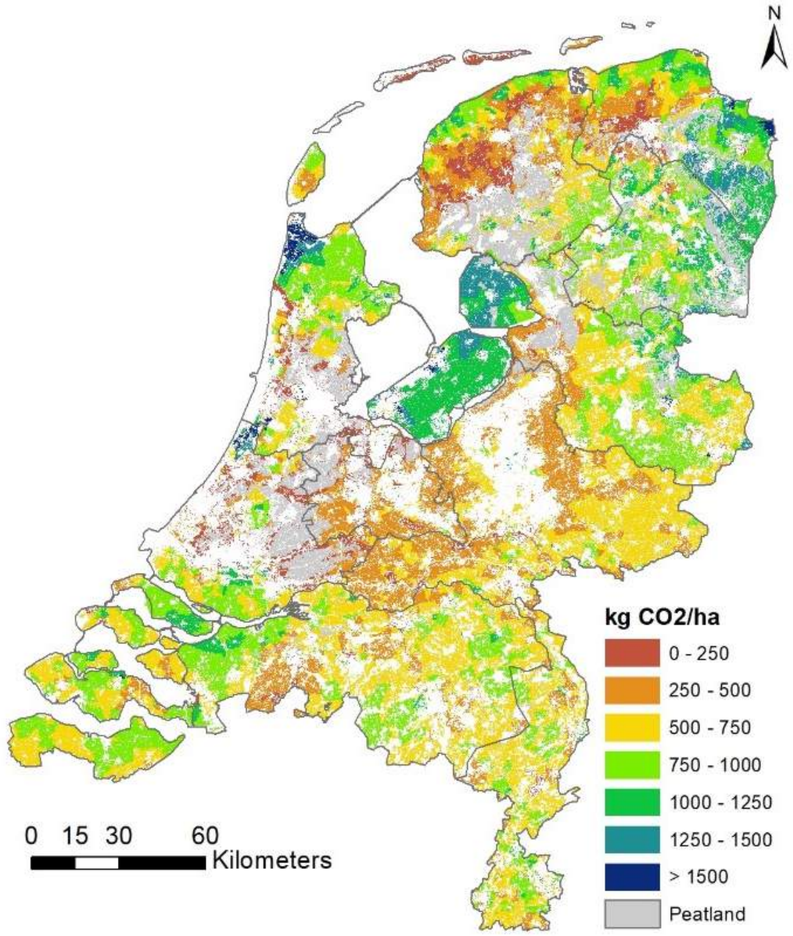
- No/reduced ploughing of arable fields
- Agroforestry
- Species rich grasland/deep rooting grasses

National potential CO_2 sequestration



Lesschen et al., in press

Combining all measures: 0,9 Mton CO_2/yesar



Lesschen et al., in press

Discussion

- In the Netherlands, different C tools available
- Model core differs among these tools → consistency required

Tool	Model core	C balance	CO2 sequestration	Trend in C-content over time	Effect carbon measures	Source	Remarks
Soil C tool	RothC	yes	yes	yes	yes	Slim Landgebruik	Trend lange-termijn
NDICEA	NDICEA	yes	yes (after adaptation)	yes	Yes (some)	LBI	Trend korte-termijn (+-12 yesar)
OS-balans	Application EOM	yes	no	no	no	NMI-Agro	
C-monitor	Application EOM	yes	no	no	no	DLV-Advies	Basal estimations
Eurofins	Application EOM	yes	no	no	no	Eurofins	Does not considere initial OM-content
C-module in Cool Farm Tool	IPCC 2006 guidelines	no	yes	no	yes (some)	IPCC	Not representative for NL
C-module in Kringloopwijzer	Application EOM	no	no	no	no	Van Dijk et al., 2020	Only EOM application to soil is estimated
Bodemconditiescore	No (qualitative assessment)	no	no	no	no	SoilPedia, LBI, WUR, AEQUATOR, BoerenVerstand	Focus on soil quality
Open BodemIndex	No (qualitative assessment)	no	no	no	no	WUR, NMI-Agro, FarmHack	Focus on soil quality
Demeter	RothC	yes	yes	yes	yes (after adaptation)	Vlaamse Land Maatschappij	Used in Flanders
C-slim	RothC	yes	no	yes	no	Bodemkundige Dienst van Belgie	Used in Flanders

- lso be used for edits (p but...)
- Enroll the visibility of the tool by linking it to other tools/platforms (e.g., Cool Farm Tool, Kringloopwijzer)

Thank you!

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