

Soil quality Veenkoloniën

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Agenda



1. Introduction
2. Research program Sustainable Soil Management
3. Project Soil Quality Veenkoloniën
4. Other research on soil quality in North East of the Netherlands
5. Soil research in Germany
6. Discussion on possible cooperation and knowledge exchange



Vruchtbare gronden



WAGENINGEN UR
For quality of life



Meten van bodemdiensten

Voedselproductie en inkomen

- Opbrengst
- Kwaliteit
- Inkomen



Waterbeheer

- Uitspoeling
- Afspoeling
- Waterbergend vermogen



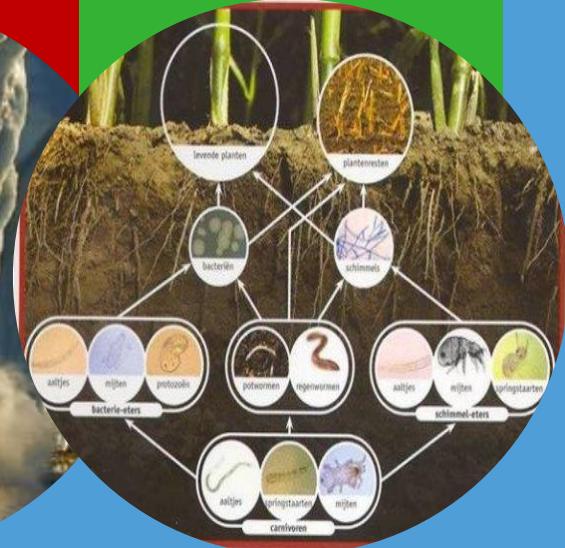
Klimaatverandering

- Energiegebruik
- Broeikasgas-emissies



Biodiversiteit

- Bodembiodiversiteit



Lange termijn systeemonderzoek

Bodemkwaliteit Veenkoloniën
Valthermond

OBS, Nagele

BASIS, Lelystad

Bodemkwaliteit op
zandgrond, Vredepeel



Soil Quality Veenkolonien



Motivation

- Agenda for the Veenkolonien → Innovation program Veenkolonien
 - Objective: increasing the ability for increased revenue
- Top sector Agro & Food:
 - Large national soil program
 - Capacity claimed for the Veenkolonien
 - Agrifirm, AVEBE, Sugar Union and LTO Noord
- Soil is the basis for improving production

Soil Challenges and Solutions

Important Challenges

- Moisture availability
- Nematodes / disease prevention
- Organic matter input
- Soil compaction
- Variation within plot
- Fertilization and soil fertility
- Slaking/dusting sensitivity

Important Solutions

- Maintenance year
- Widening crop rotation
- Supply of organic matter
- Responding to variability
- Improve soil fertility
- Non inversion tillage
- Groundwater level management

Objective

- Development and testing of measures and farming systems for sustainable soil management in the Veenkolonien that
 - Help to improve yield and income
 - Contributions to social issues
- Transfer of soil knowledge to practice
- Pivotal role in soil research in NO-NL



Measures in experiment

1



2



3



4



5 combination
6 free object



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Crop rotation



Summer barley



Starch potato
early variety



Sugar beet



Starch potato
late variety



Extensive experimental set up per crop

	Spading	Repetition 1	Repetition 2	Combination	
headland	Non inversion tillage		Tagetes No applications	Chemical soil fertility	headland
	Non inversion tillage				
	Spading		Repetition 3	Repetition 4	

Extensive experimental set up per crop

headland	Spading	Repetition 1		Repetition 2		Repetition 3		Repetition 4		headland
		0 Ref	1 NKG	2 Compates	3 Tag post	4 Chemical soil fertility	5 Combination			
	Non inversion tillage									
	Non inversion tillage									
	Spading									

Soil measurements at start of experiment

- 0-30 cm
- Reference and Combination
- Intensive on measurement plot (summer barley)
- Extensive on other plots
- Organic matter
- Soil fertility
- Biomass fungi and bacteria
- Plant parasitic nematodes and other nematodes
- Verticillium
- Bulk density
- Water retention capacity
- Penetration resistance

Measurements

■ Annual measurements

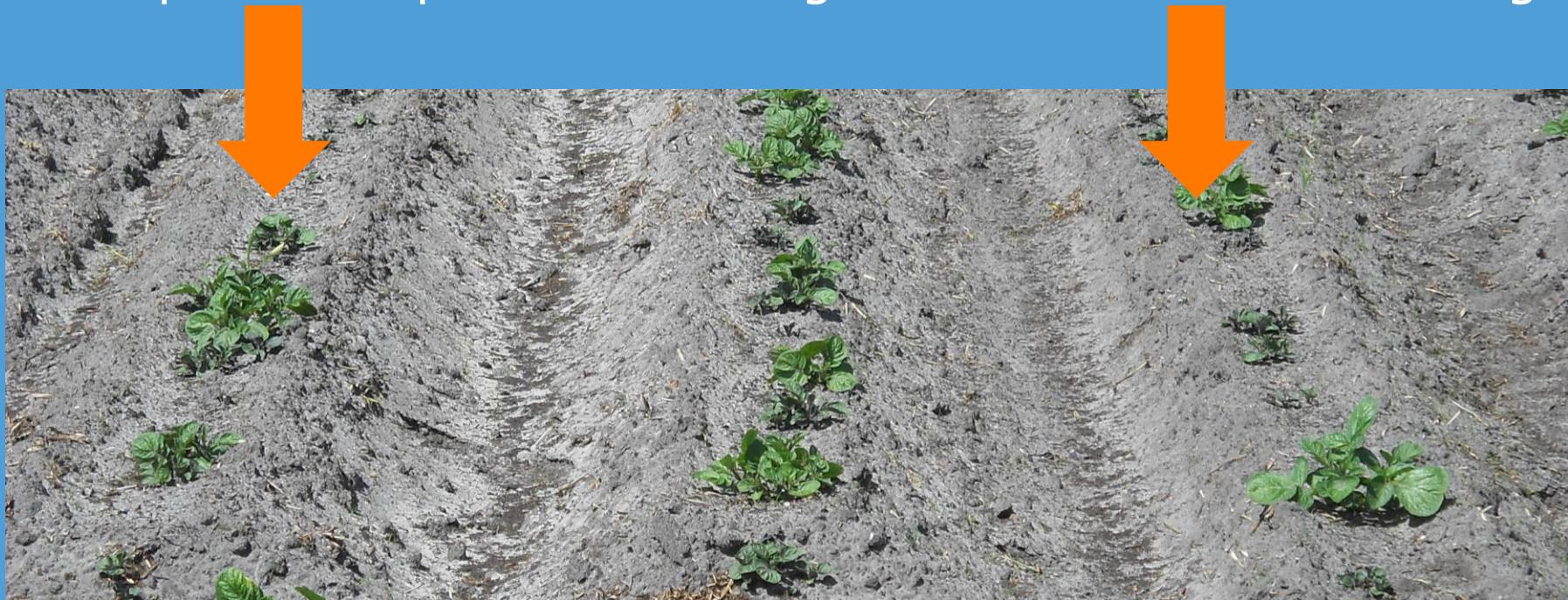
- Yields and crop quality
- Crop Observations:
 - stand density, soil cover, pests and diseases
- N-min spring, after harvest and autumn
- N and P in crops and crop residues

■ Accidental

- Environmental effects (e.g. leaching, greenhouse gases)
- Other soil parameters

First results

- Successful lay out of the experiment (treatments)
- No differences were observed in crop development
- On spaded strips more dusting than in non inversion tillage

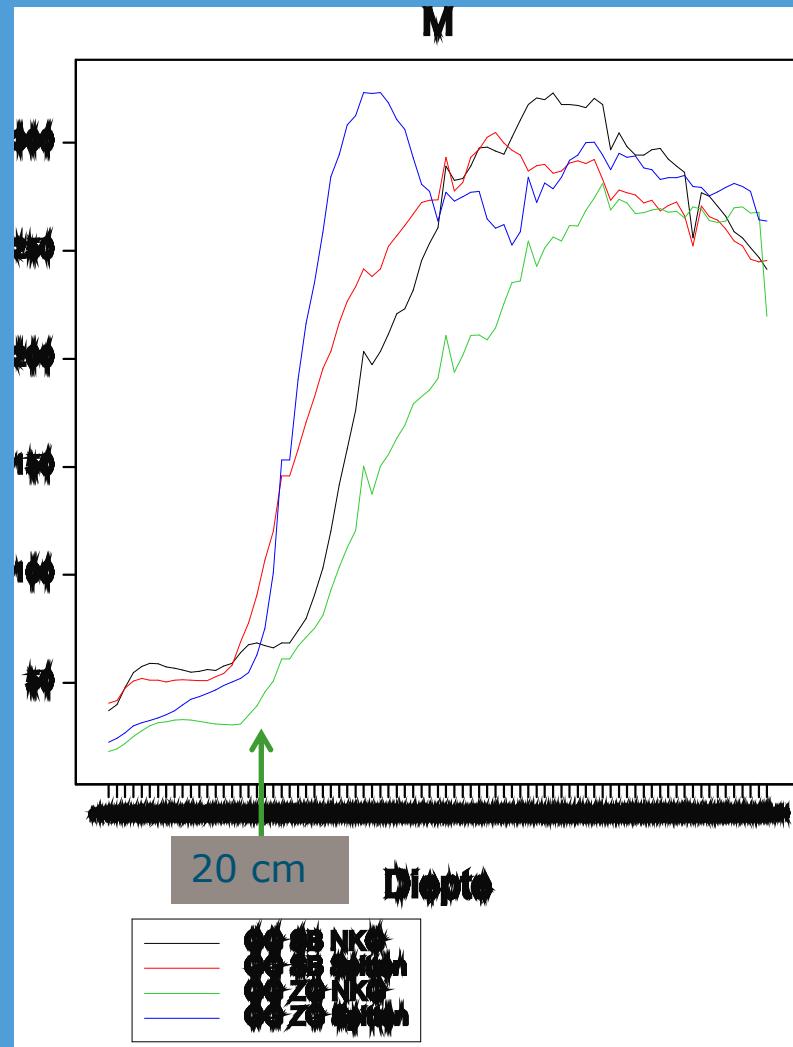


First results start measurement

- Strong variation in organic matter content
 - O.m. content Loss on ignition: 6.6 to 25.1 (av 11.9)
 - O.m. content NIR: 7.2 - 18.7 (av. 11.3)
 - pH: 4.7 to 5.3 (av. 5.0)
- Very strong correlation between o.m. content and moisture content of the soil
- Plots are quite heavily infected with *Verticillium dahliae*, wilt disease

First results start measurements

- Penetration resistance



Activities on the short term

- Rounding off start measurement
- Analysis results first growing season
- Nitrate leaching measurements
- Measurements of o.m. content and pH per subplot
- O.m. characterization
 - DOC, hydrophile, hydrophobic o.m.

Soil and structure improvers



Soil and stucture improvers

Clay soil

- Kollumerwaard
- Lelystad
- Westmaas

Sand and reclaimed peat soil

- Valthermond
- Vredepeel



Experiment

- Representative rotation
- Application according to advice provider
- NPK application equal
- Crop observations
- Yield + crop quality
- Soil observations 2010-2012-2015

Rotation Valthermond

- 2010: sugar beet
- 2011: potato
- 2012: summer barley
- 2013: potato
- 2014: sugar beet
- 2015: potato



Soil and structure improvers

Calcium and lime fertilizers

- Agrigyps



- PRP-SOL



- Betacal-carbo



- Brandkalk



References

- Compost



- Slurry



- Chem. fertilizer



Bodemverbeteraars

■ Stimulating soil life

- Condit 7% N



- Xurian Optimum



- Bactofil



■ Others

- Biochar



- Rock dust



Soil measurements

■ Soil physical

- texture
- bulk density
- penetration resistance
- spade test
- infiltration rate

■ Ecological measurements

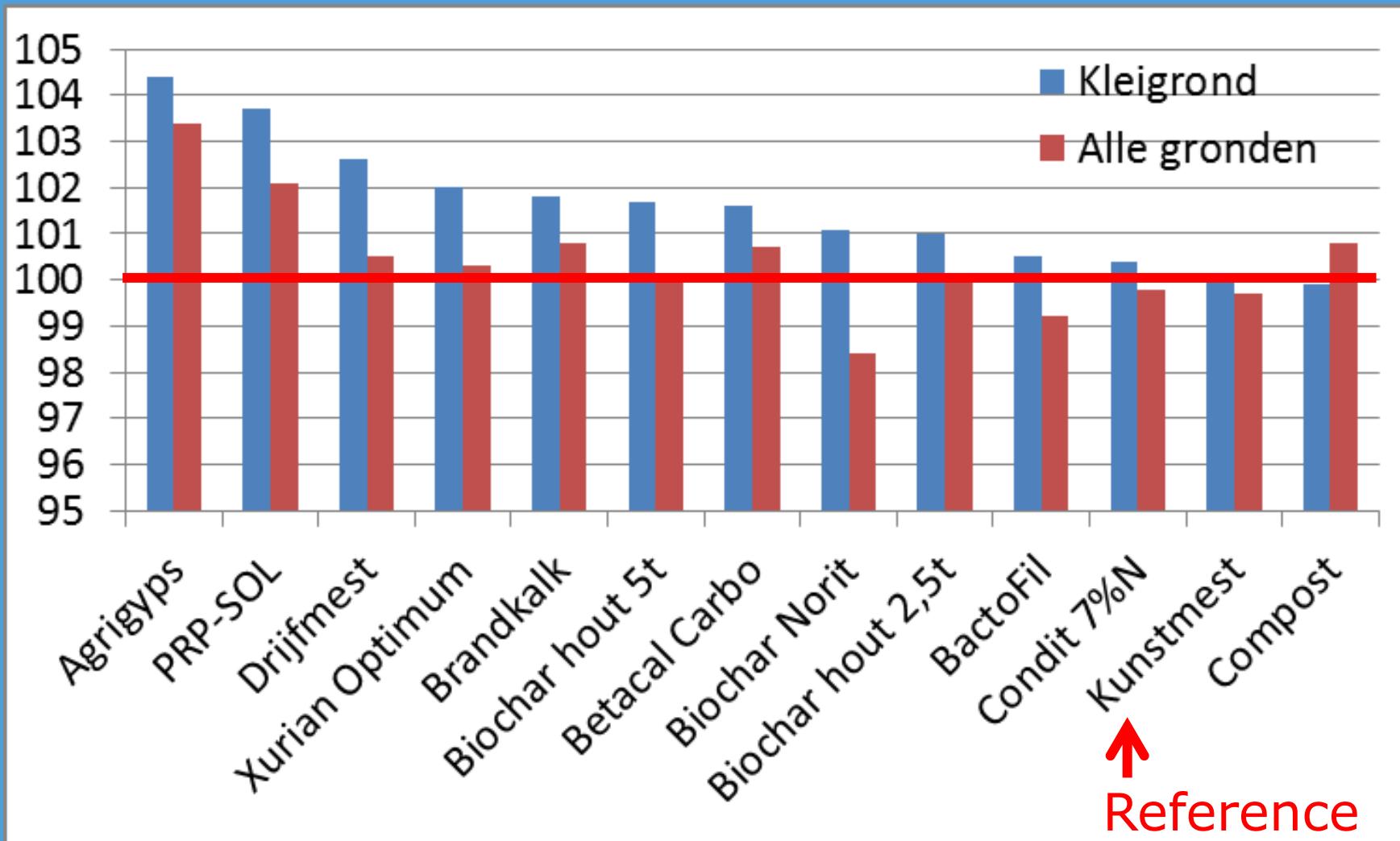
- nematodes
- BFI (fungal / bacterial ratio)

■ Soil Chemical

- General (pH, P, K, Mg, Na, KZK)
- CEC and occupation (Ca, K, Mg, Na)
- Ca in soil moisture
- Organic matter (hydrophobic, HWC)



Results crop yields 2010-2012



Soil measurements 2012

behandeling	Bodem eigenschap											Biologisch	
	Fysisch	Chemisch											
		Agg, Stabiliteit	pH	Ca- beschik baar	CEC grootte	CEC bezetting	Ca bodem vocht	Organische stof					
								Hydro- foob	Hydro- fiel		BFI		
Agrigyps	122	103	124	98	100	101	179	101	57	145	93		
Betacal Carbo	99	105	36	98	100	103	119	94	195	168	65		
Brandkalk	81	98	91	95	95	190	105	90	83	136	100		
PRP-sol	89	101	111	94	100	100	107	90	147	139	77		
Condit	99	102	91	97	101	99	81	84	90	137	69		
Xurian	62	101	82	99	100	97	105	87	67	184	84		
Bactofil	58	101	90	94	101	96	100	98	92	118	95		
BiocharNorit	107	95	122	112	100	112	50	49	75	105	74		
Biochar2,5t	96	104	68	76	101	83	129	92	70	76	56		
Biochar5t	127	103	66	101	101	96	86	99	53	104	83		
compost	95	104	60	101	101	98	100	96	64	112	105		
drijfmest	96	100	103	101	100	97	107	102	87	107	78		
kunstmest	100	100	100	100	100	100	100	100	100	100	100		

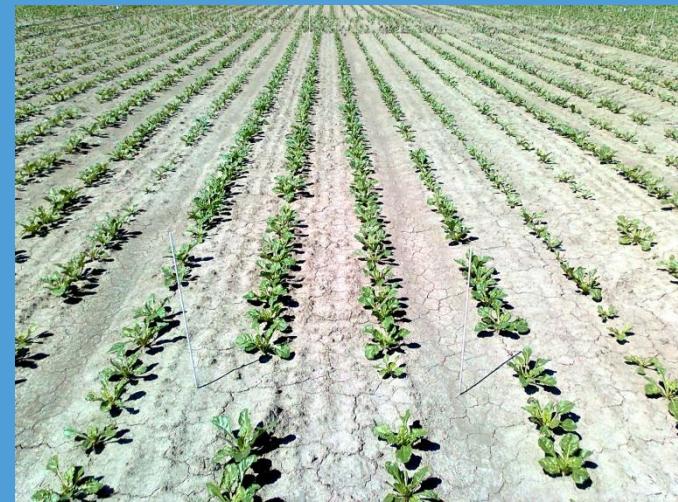
afwijking tov kunstmest
0-5%
+ 6-10% - 6 - 10%
> +10% > - 10%

Soil measurements 2012

- No clear difference between objects
- Macro-aggregates
 - Higher penetration resistance for Betacal Carbo and slurry treatment relative to rest
 - no difference
 - permeability measurement
 - visual assessment
- Micro-aggregates
 - Ca availability and hydrophilic organic matter was higher in Agrigyps & PRP Sol than in compost
 - Fertilization effect in crop yield

Conclusions

- After 3-4 years, no significant differences in yields
- In the 3rd year, no differences in soil quality



Other projects



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Farmer networks

- pH as key for yield improvement
- Irrigation as key for yield improvement
- Early wear of crops induced by irrigation
- Quantification of effect of soil improvement
- Eliminating soil compaction

- Demonstration project soil tillage and effects on climate change
- Skylark project