Why to measure soil quality?

- National Program Agricultural soils in the Netherlands (2019):

  - Agricultural soils are sustainably managed in 2030

  - A zero measurement of soil quality will be done in 2020

    - Comprehensive, common and uniform

  - Set of indicators need to be identified

Bodemindicatoren voor Landbouwgronden in NL BLN-indicator set, version 1.0

- Comprehensive soil quality review:

    - Several functions: production, climate, water, biodiversity, …

- From a scientific perspective:

    - Indicators with accurate and reliable measurement methods

    - Added cheap and fast alternative methods

- Selected for:

    - National and regional monitoring of soil quality

    - Application on field level by farmers

BODEMINDICATOREN VOOR LANDBOUWGRONDEN IN NEDERLAND (BLN)

Voor uniforme bodemkwaliteitsbeoordeling en duurzaam beheer

Organische stof
- Organische stofgehalte en koolstofgehalte
- Stabiele fractie organische stof
- Afbreekbare fractie organische stof

Fysisch
- Watervasthoudend vermogen
- Aggregaatstabiliteit
- Textuur
- Indringingsweerstand
- Bulkdichtheid

Chemisch
- Zuurgraad pH
- Stikstof totaal
- Potentieel mineraliseerbare stikstof
- Kalistatus
- Fosfaatstatus

Biologisch
- Regenwormen aantallen en diversiteit
- Bacterie en schimmelbiomassa
- Aaltjes diversiteit en aantallen (incl. plantparasitaire aaltjes)

Visueel
- Visuele beoordeling
  - fysisch
  - chemisch
  - biologisch

MET METING VAN BODEMKWALITEIT GERICHT WERKEN AAN VERSTERKEN BODEMFUNCTIES
PRODUCTIE • WATERREGULATIE • KOOLSTOFOPSLAG • RECYCLING NUTRIËNTEN • BIODIVERSITEIT

WAGENINGEN UR
For quality of life

BLN indicatorset, version 1.0

	Nr	Indicator	Unit	Classical method	Alternative method
OM	1	Organic matter content	%	Loss on ignition	NIRS
OM	2	Carbon content	%	Dumas	NIRS
OM	3	Labile organic matter fraction	mg kg^{-1}	Hot water extraction (HWC)	n.a.
Fysical	4	Water holding capacity	%, mm	Sandbox / pressure pan	Based on texture & OS%
Fysical	5	Aggregate stability	-	Wet sieving method	n.a.
Fysical	6	Texture	%	Pipet method	NIRS
Fysical	7	Penetration resistance	MPa	Penetrometer	
Fysical	8	Dry bulk density	kg m^{-3}	Mass after drying 105°C	Based on OS%
Chemical	9	Acidity (pH)	-	Extraction in CaCl$_2$	
Chemical	10	Total nitrogen	mg kg^{-1}	Hassink (1995)	NIRS
Chemical	11	Potential mineralisable nitrogen (PMN)	mg kg^{-1}	Anaerob incubation	NIRS
Chemical	12	Phosphate status (P-Al, P-CaCl$_2$)	g kg^{-1}, mg 100 ml^{-1}	Extraction in ammonium lactate-acetic acid, CaCl$_2$	NIRS
Chemical	13	Potassium status (K-CEC, K-CalCl$_2$)	mmol$^+$/kg, g kg^{-1}	Extraction in Cohex, CaCl$_2$	NIRS
Biological	14	Nematod numbers and diversity (incl. plantparasitic nematods)	# taxa, # 100 ml^{-1} grond	Microscopy	PCR
Biological	15	Bacteria & fungi biomass	μg kg^{-1}	Microscopy	PLFA
Biological	16	Earthworm numbers and diversity	# m^{-2}, kg m^{-2}	Visual	n.a.
	17	Visual soil assessment	Various	Visual	n.a.

Further developments of BLN-indicatorset, towards version 2.0

1. Evaluation of the BLN indicator set version 1.0
2. Improve methodology of soil quality assessment
3. Selection system of indicators, based monitoring objective
4. Evaluation of other indicators & measurement techniques
5. Establishment of more reference and target values
6. Develop farmer tools based on the BLN-indicator set

→ *Do this in collaboration and coordination within EJP SOIL*

WAGENINGEN
UNIVERSITY & RESEARCH

Thank you for your attention

janjo.dehaan@wur.nl