Use of N-min measurements in autumn to evaluate nitrate leaching risks

7th meeting EUVRIN Working group Fertilization & Irrigation

12 September 2024, Janjo de Haan

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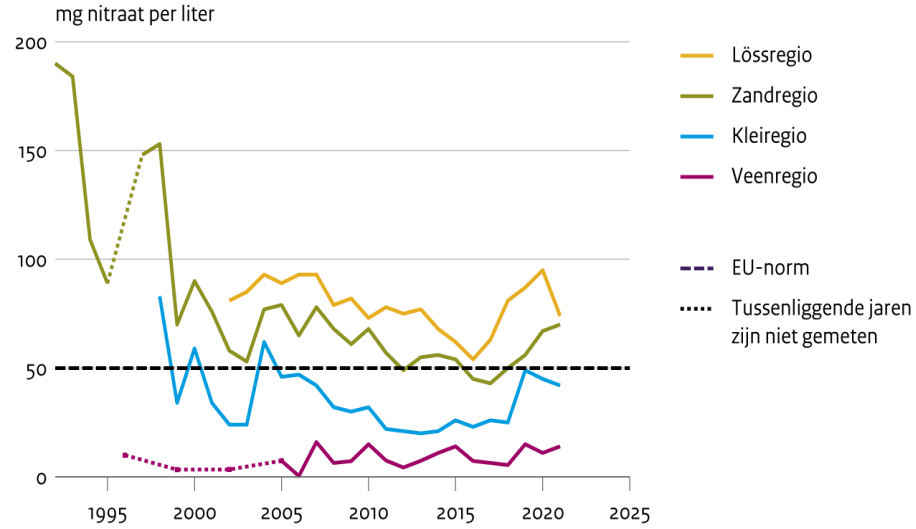
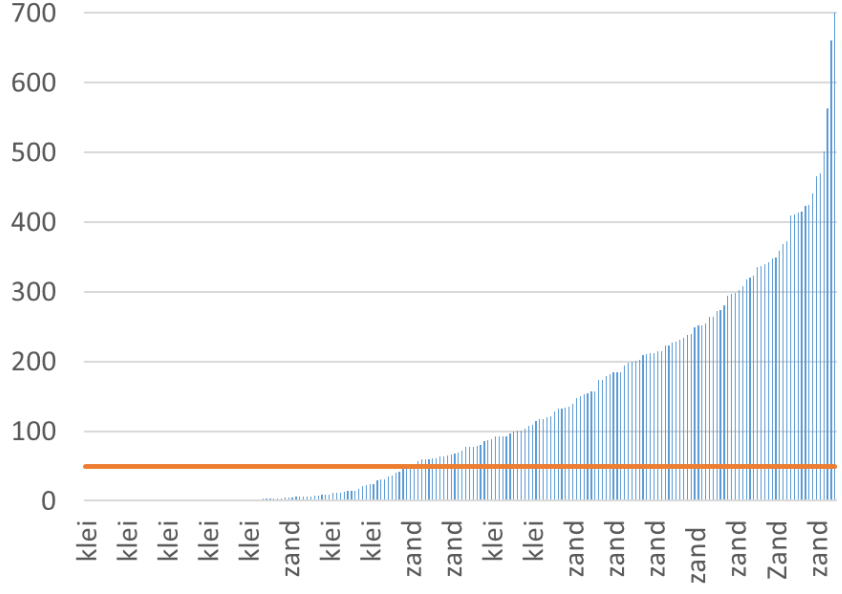
Nitrate leaching too high in the Netherlands on sandy soils

Average dairy & arable farming per soil type



Bron: RIVM, Landelijk Meetnet effecten Mestbeleid (LMM)

Field vegetables 2017-2020 monitoring



RIV
www.clo.nl/

Increased pressure from Nitrate action programs

- Extensive crop obligation
  - At least 1:4 extensive crop on sandy soils & loess soils
- Catch crop obligation leaching sensitive crops
  - Harvest before 1 October on sandy soils & loess soils
- Nutrient polluted areas assigned
  - extra 20% reduction in N-application in designated areas
- Application restrictions for N, P & organic manure
  - South east sandy soils about 30% below fertilization recommendations

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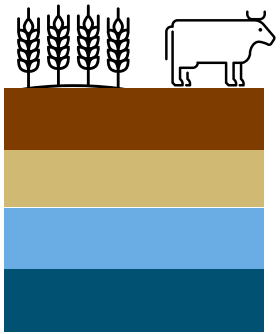
Indicators for nitrate leaching

Steering with measures



Crops/animals

Nitrogen input — *Application restrictions NL*

Nitrogen balance

Nitrate in the (upper) soil — *Goal steering ideas NL* *See Flanders & Baden-Wurttemberg*

Nitrate in upper groundwater — *EU Nitrate directive, national agricultural monitoring*

Nitrate in groundwater

Goal steering

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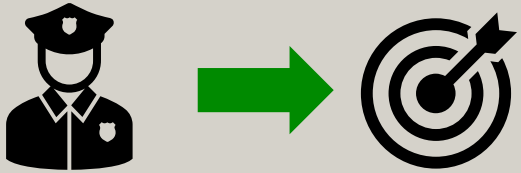
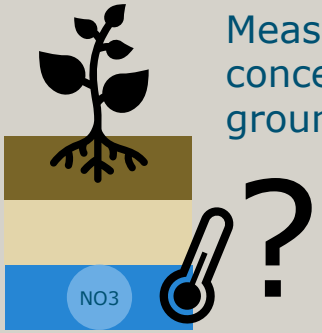
Goal steering: solution or holy grail



From control by measures to focus on goals



Measure nitrate concentrations in groundwater

Difficult, expensive, time consuming

Alternative indicators

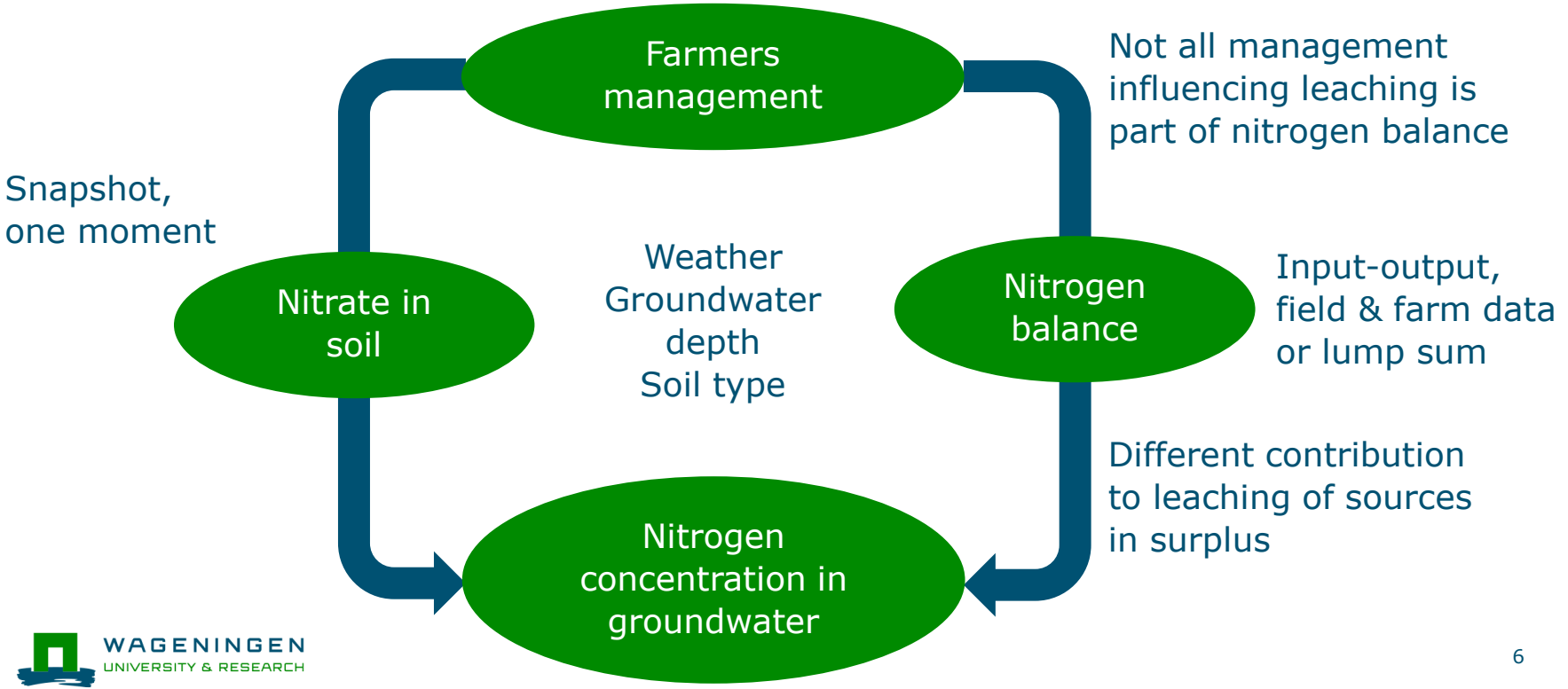
(+)

Nitrogen balance calculation

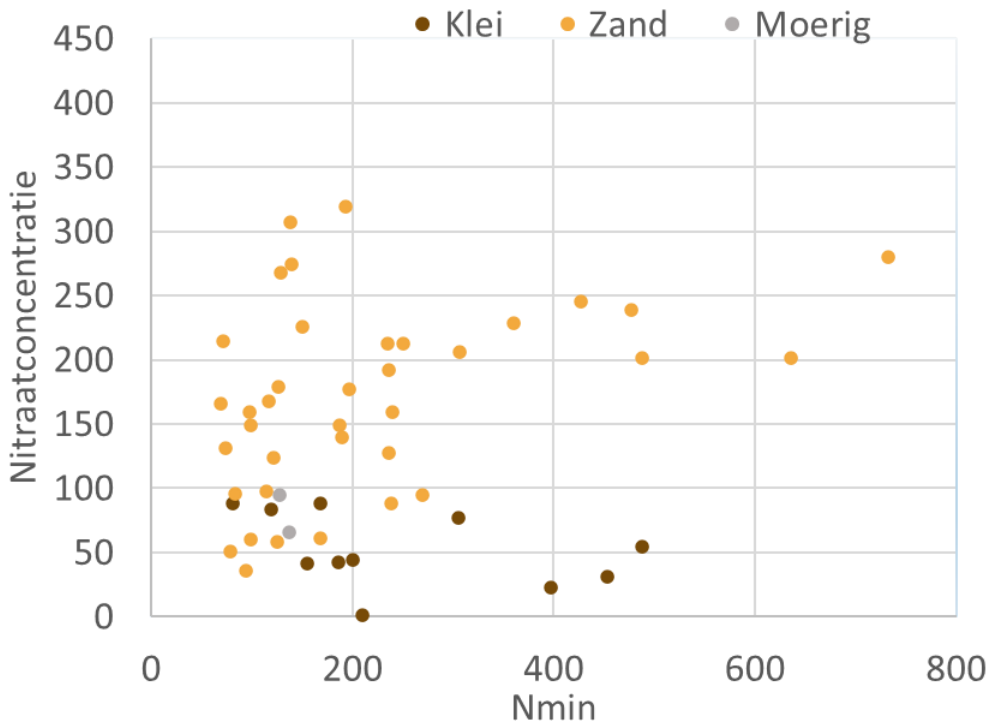
N-min measurement

Guarantee of reliable and secured data?

Nitrate in soil and nitrate balance as indicators for nitrate leaching



Relation N-min in soil and nitrate concentration

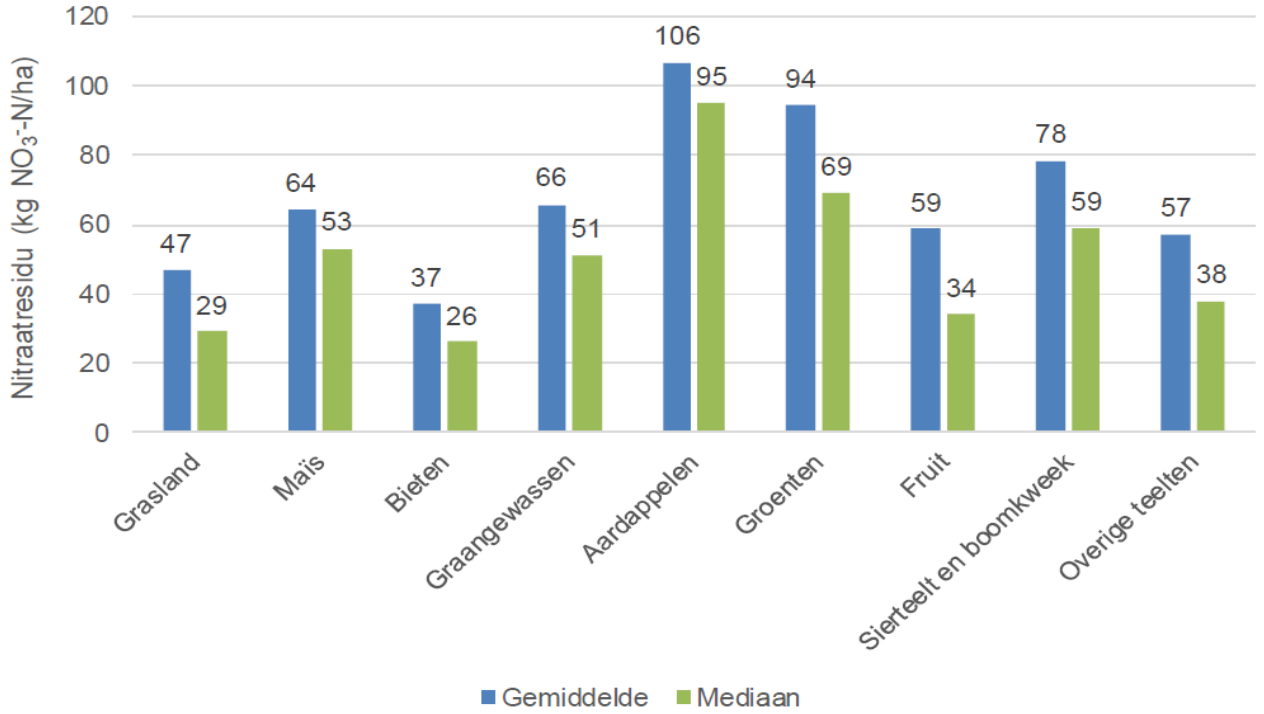


Target values N-min

Rules of thumb in the Netherlands to reach 50 mg nitrate per liter

- Clay and loamy soils 88 kg/ha
- Sandy and loess soils 45 kg/ha

Differences between crops N-min measurements



Results measurements farmers fields 2017 Flanders

Causes of differences between crops

N-use index (uptake/ available mineral N)	N in crop residues (kg N/ha)			
	0-50	50-100	100-150	>150
> 0,8	Winter wheat	Beetroot	Fennel	Red cabbage Fresh peas
0,7-0,8	Carrot Cichory root Endive		White cabbage Brussels sprouts Sugar beet	
0,6-0,7	Maize	Kale Chinese cabbage Iceberg lettuce Green beans		
0,5-0,6	Potato Kohlrabi	Celeriac Leek	Cauliflower	Broccoli
0,4-0,5	Lettuce Onion Spinache			

Various projects and programs with N-min measurements

COSUN Tool for processing and interpretation N-min measurements

Nmin measurement

- Result
- Interpretation
- *-> judgement*

Nitrogen balance

- Nitrogen surplus
- *-> judgement*

Fertilization

- Recommendation
- Realized fertilization
- *-> judgement*

Inspiration

- Solutions
- Measures
- Strategies
  - …

Attention points

- Quality aspects
- …

Data overview

- Field
- Weather
- Management

Reading guide

- How to use/instructions
- Backgrounds of target values, calculations etc.

Cosun

Conclusions

- Nitrogen crisis strikes also field vegetable growers in the NL
  - Allowed fertilization levels way below recommendations on sandy soils
- Mineral N in soil as indicator gets a lot of attention in NL
  - Least bad indicator to estimate N-leaching
  - Good indicator to make farmers aware & improve fertilization
  - Combination with nitrogen balance desired
  - Good indicator for goal steering???