# Implementation of KNS in Flanders

Joris De Nies 11/5/2017

# Why need for N-advising system?

Vegetables: High N-demand, inefficient N-uptake

VERSUS

Environment: Reduce N-leaching

How achieved in Flanders (legally)

1/ Max. Fertilisation standards for vegetables

3 groups: I: 225 II: 160 III: 115 kg N/ha

2/ Obligated (2013): 1 N-advice/2ha vegetables (group I, II high/moderate N-demanding crops)

Advice not binding

3/ Nitrate residue in soil(oct-nov) threshold 85-90 kgN-NO3/ha

# N-advising sytems in Flanders

Mainplayers:

Laboratory: Soil Service Belgium (Prediction model based on 18 factors)

3 Research stations vegetables (KNS or adapted)

KNS: Origin Germany, **K**ultur-begleitenden **N**min-**S**ollwert system

Main principle

Fertilisation based on target values for nitrogen and the N-content in the soil, according to rooting depth and counting for mineralisation

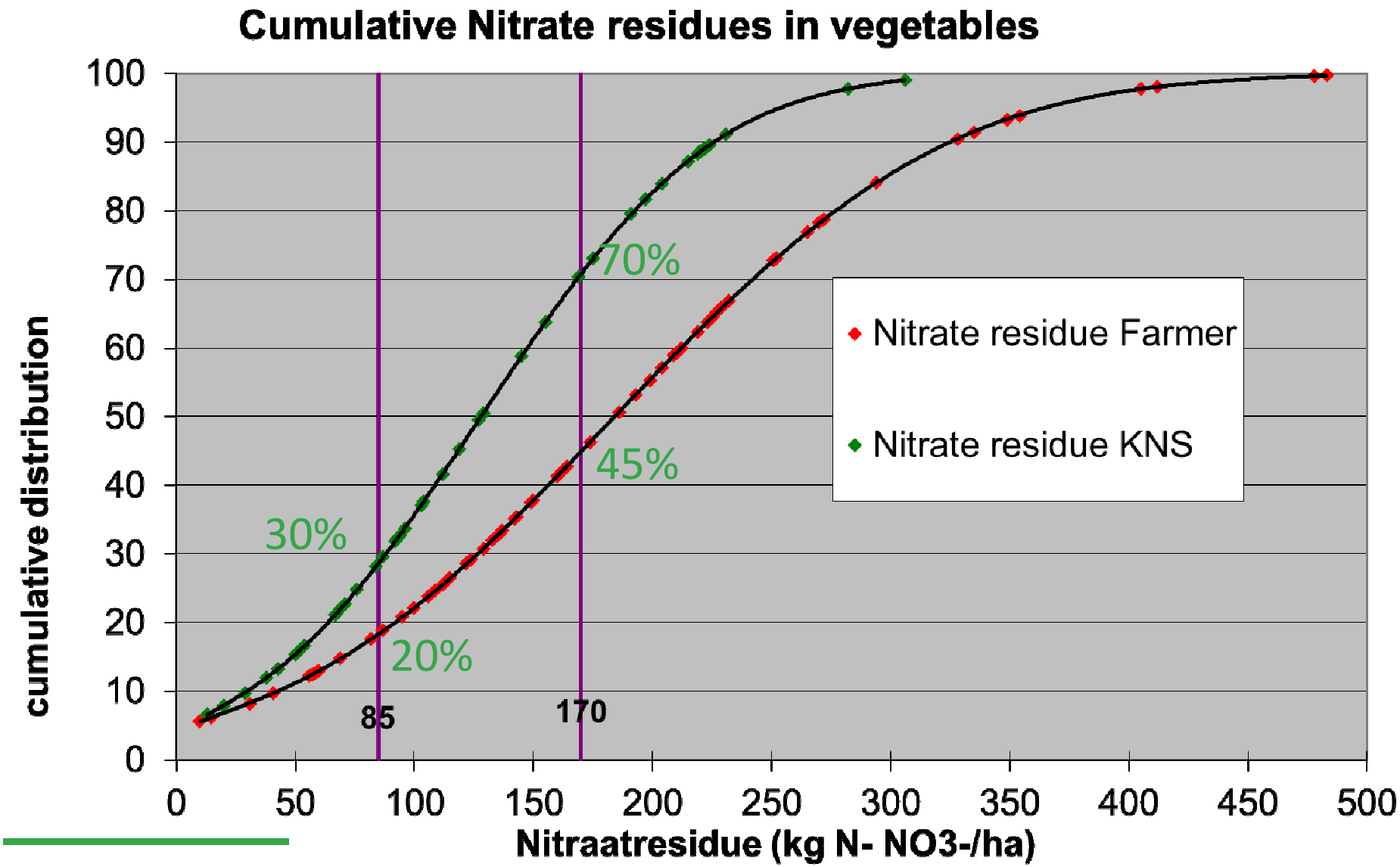
- Soil samples
- Long growing period (after 6-8 weeks additional samples) fractionation fertilisation
- Avoiding unpredicted climate conditions (eg rain)
- Incorporate mineralisation by measuring more frequently (soil mineralisation, crop residues, green manure)
- Preventing leaching out

# KNS in Leek

| Leek | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Plantation apr/jun Harvest aug/feb Production Market: 50T/ha Total 72 (T/ha)** | | | | | | | | | | | | | | |
| **Weeks after plant** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | 10 | **11** | **12** | **13** | **14** |
| N-uptake | 0 | 1 | 2 | 4 | 5 | 8 | 12 | 19 | 29 | 38 | 40 | 31 | 17 | 10 |
| Cumul N-uptake | 0 | 1 | 3 | 7 | 11 | 19 | 32 | 51 | 79 | 118 | 158 | 188 | 205 | 215 |
| Latent N | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 60 | 60 | 60 | 60 | 60 |
| Rooting depth | 30 | 30 | 30 | 30 | 30 | 30 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Target value N(0-30) | 159 | 159 | 158 | 156 | 153 | 148 | | | | | | | | |
| target value N (0-60) | | | | | | | 256 | 243 | 224 | 196 | 157 | 117 | 87 | 70 |
| **TV with min. (0-30)** | **115** | | | | | | | | | | | | | |
| **TV with min. (0-60)** | | | | | | | **211** | **204** | **191** | **168** | **135** | **101** | **76** | **64** |

Static model: fixed production (plantdensity)
fixed growing curve
mineralisation rate (standard 0.8kgNmin/ha/day
no correction for deviating temperature/rain/…

# KNS-system on pilot farms

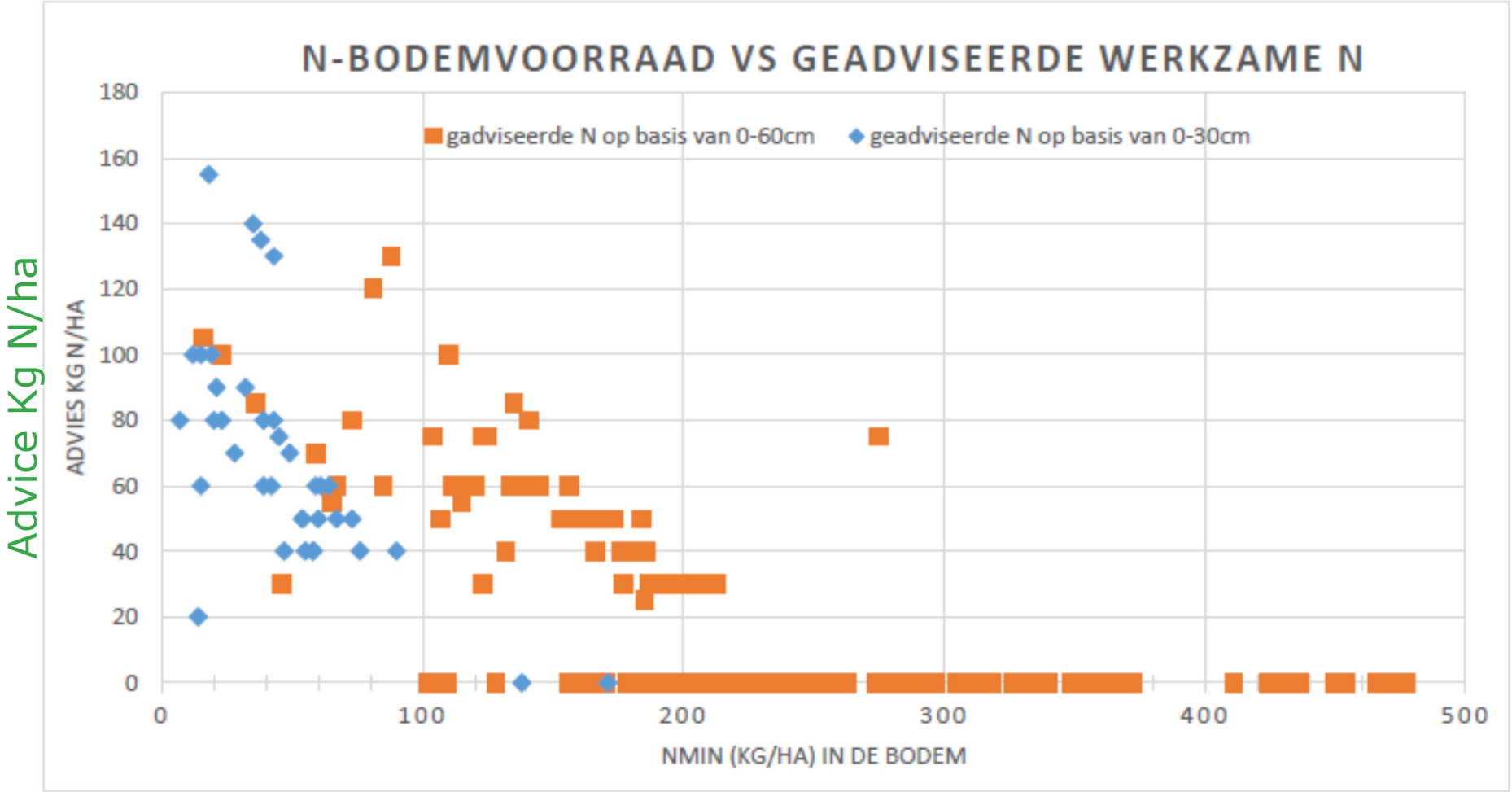



PROEFSTATION VOOR DE GROENTETEELT

# Overview N-advices in leek

| Summary of 246 N-advices in leek (2013) | |
|---|---|
| advised available N on individual soil samples (kgN/ha) | |
| 0 kgN/ha | 63,8 |
| 1-50 kgN/ha | 16,3 |
| 51-100 kgN/ha | 16,7 |
| 101-150 kgN/ha | 2,8 |
| 151-200 kgN/ha | 0,4 |
| 201-225 kgN/ha | 0,0 |
| >225 kgN/ha | 0,0 |
| advised available N in function of growth stage (%) | |
| Before planting >2 weeks | 4,1 |
| Before planting <2 weeks | 13,0 |
| 0-3w | 12,6 |
| 4-7w | 21,1 |
| 7-9w | 34,6 |
| 10-11w | 5,7 |
| >11w | 8,9 |

# N-content in soil vs adviced N




Advice Kg N/ha

Nmin (kgN/ha) measured in soil

# KNS-system in practice

EVALUATION

- able  to lower high N-input
- can reduce nitrate residues (from high to moderate)
- current advices no losses of quantity/quality (credibility)
- Avoiding uncertainty by

BUT

achieving low nitrate residues (<90kgN/ha) in all cultures?

KNS (and others) not sufficient

# Improvements

Possible research topics

- Better integration of real mineralisation rates (see later)
- How to work with actual growing stage
- Keep it simple to farmer
- Contribution of new technologies
  (eg measurements reflection sensors)
  ⟹ experience ISARIA

Questions?
Joris De Nies
Joris.de.nies@proefstation.be