

# Opportunities to improve fertilizer efficiency and crop yields

The case of silage maize in the Netherlands

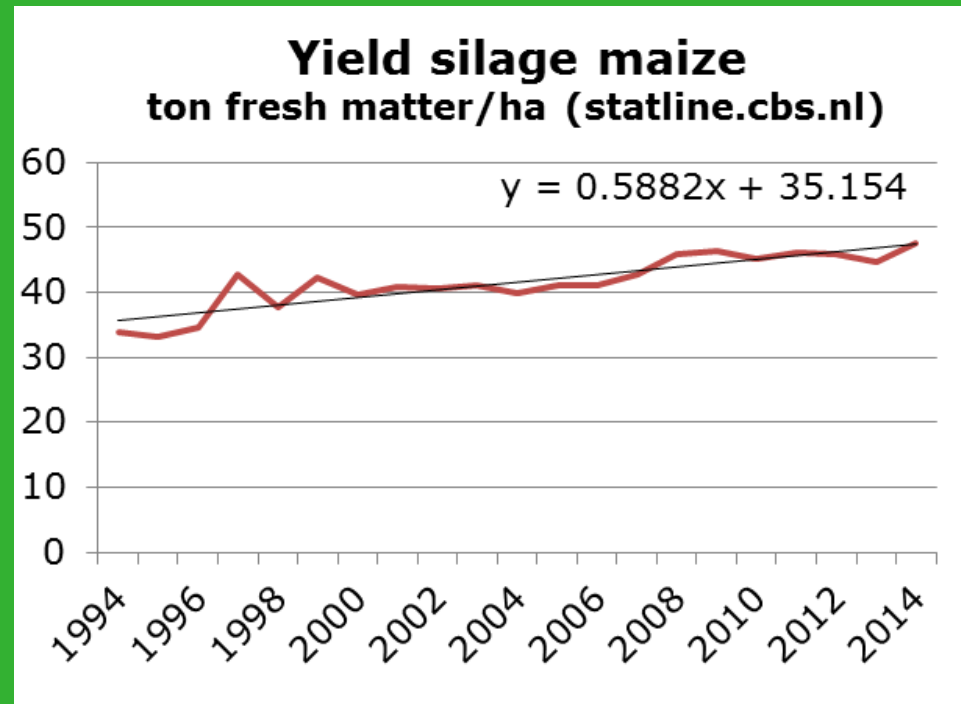
Presentation for delegation Stanley Agricultural Group

Wageningen 24 August 2016, JJ de Haan & JTW Verhoeven



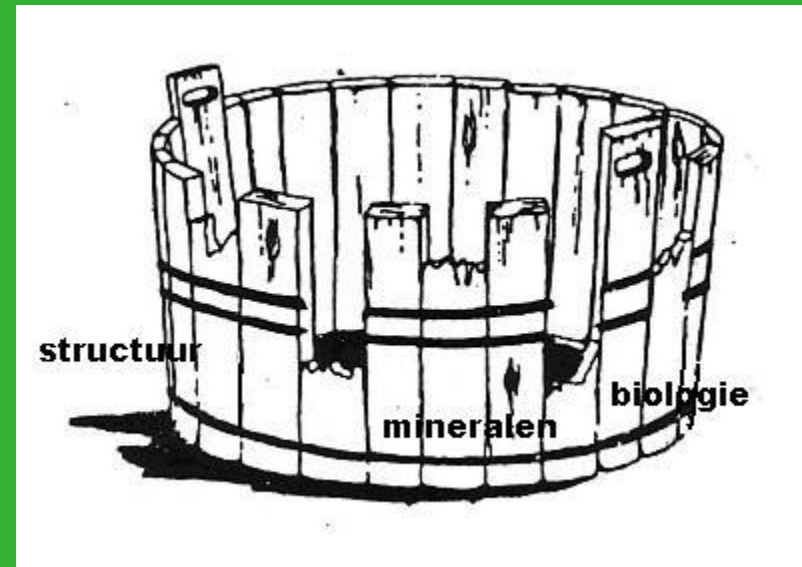
# Yield development silage maize

- NL: 225.000 ha/year  
12% agricultural area
- 1994-2014: yield increase of 40%
- Variety trials: average yields 21 ton d.m./ha  
→ yield improvement possible



# Excellent soil fertility in the Netherlands

- Moderate sea climate
  - Sufficient rainfall
- Sufficient organic matter level
  - Animal manure
- Sufficient nutrients & soil pH
  - Soil testing every 4 years
  - Animal manure
  - Liming to target levels
  - Chemical fertilizers



**Veris scan for site specific measurements of pH, EC and organic matter**



Nutrient	Fertilization Advice
Nitrogen	205 kg/ha – soil mineral nitrogen stock, single application
Phosphorus	<ul style="list-style-type: none"><li>• Phosphorus removal by crop (maize 1.1 kg/ton fresh)</li><li>• Soil phosphorus levels (P-CaCl<sub>2</sub> and P-Al)</li></ul>
Potassium	<ul style="list-style-type: none"><li>• Potassium removal by crop (maize 4.3 kg/ton fresh)</li><li>• Soil potassium levels</li></ul>
pH-level	Depending on organic matter or clay content
Secondary and micro nutrients	<ul style="list-style-type: none"><li>• Depending on soil status (Mg, S, B, Mn, Cu)</li><li>• Depending on observed deficiencies in crop (Ca, B, Mn)</li><li>• No advice (Mo, Fe, Zn)</li></ul>

# Application Standards Nitrogen and Phosphorus Maize (kg/ha)

	2006	2016
Nitrogen in animal manure	170	170
Available nitrogen from fertilizers	Sand 185 Clay 205	Sand 112-140 Clay 185
Phosphorus	95	High soil-P 50 Moderate soil-P 60
Phosphorus in animal manure	85	Low soil-P 75





# Application of animal manure

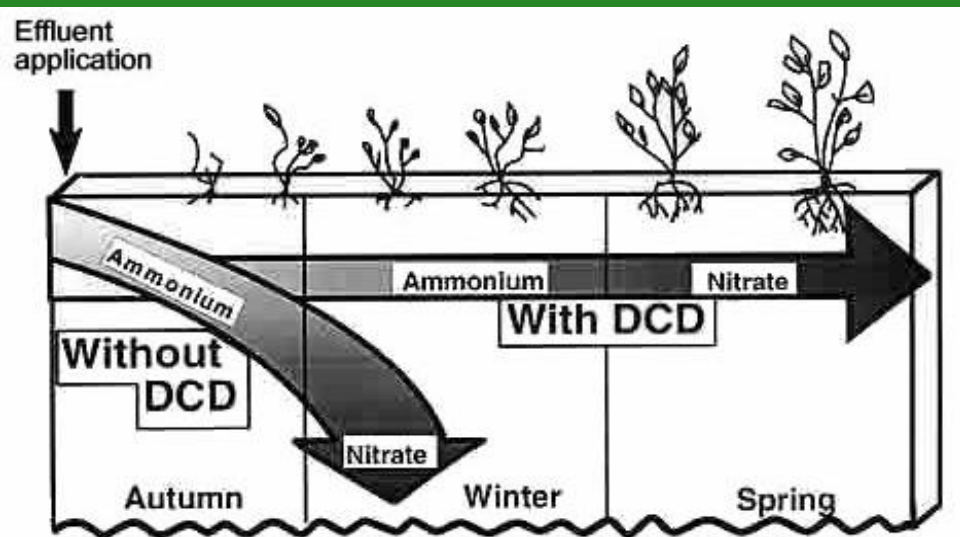
## Manure injection on arable land



## Row injection of animal manure



## Nitrification inhibitors



## Direct nitrogen measurements in manure with NIRS and precision application





# Application of chemical fertilizer

**NP-starter fertilizer in the row**



**P-coating of seeds**



**P from struvite**



**Precision fertilization**



# Green manure cropping after harvest

- NL: obliged after silage maize on sandy soils
- Positive effect on
  - Crop Yield
  - Financial return
  - Soil quality
  - Nitrogen availability
  - Environment



Leaf  
cabbage



Fodder radish



Triticale

Winter barley

Winter rye

Winter wheat



Grasses  
(undersowing)





# Knowledge transfer

Study groups and pilot projects



Field days



Internet tools: Farm Maps



Lectures and presentations



# Secret of Dutch agriculture

Fertile soils

Good climate

Availability of manure

Crop rotation

Strict legislation

Trained farmers

Innovation

Cooperation farmers  
– advice – research



→ Can we translate this to China?

