



# Reduction of organic matter input reduces nitrate leaching and crop yield on the long term

Janjo de Haan, Willem van Geel, Harry Verstegen

## Research question

What is the effect of a reduction in organic matter input on nitrate leaching and crop yield on the short and long term?



## Systems research

Since 1989, a long-term experiment on the development of sustainable arable and vegetable farming systems in the S.E. of the Netherlands is running. Soils are sandy and sensitive to nitrate leaching.

The farming system consist of a full 6-year rotation:

- 2005-2010: potato – triticale – lily – fresh peas followed by winter leek – silage maize – sugar beet.
- 2011-2012: potato – fresh peas – leek – summer barley – sugar beet – silage maize.

Since 2001 division of each crop in two parts:

- with regular organic matter input with manure: effective organic matter (EOM) input about 1600 kg/ha (RegularOM)
- without organic matter input with manure: EOM-input about 900 kg/ha (LowOM)

Systems have a similar amount of available nitrogen for crop growth and a balanced fertilization strategy. Catch crops are grown where possible.

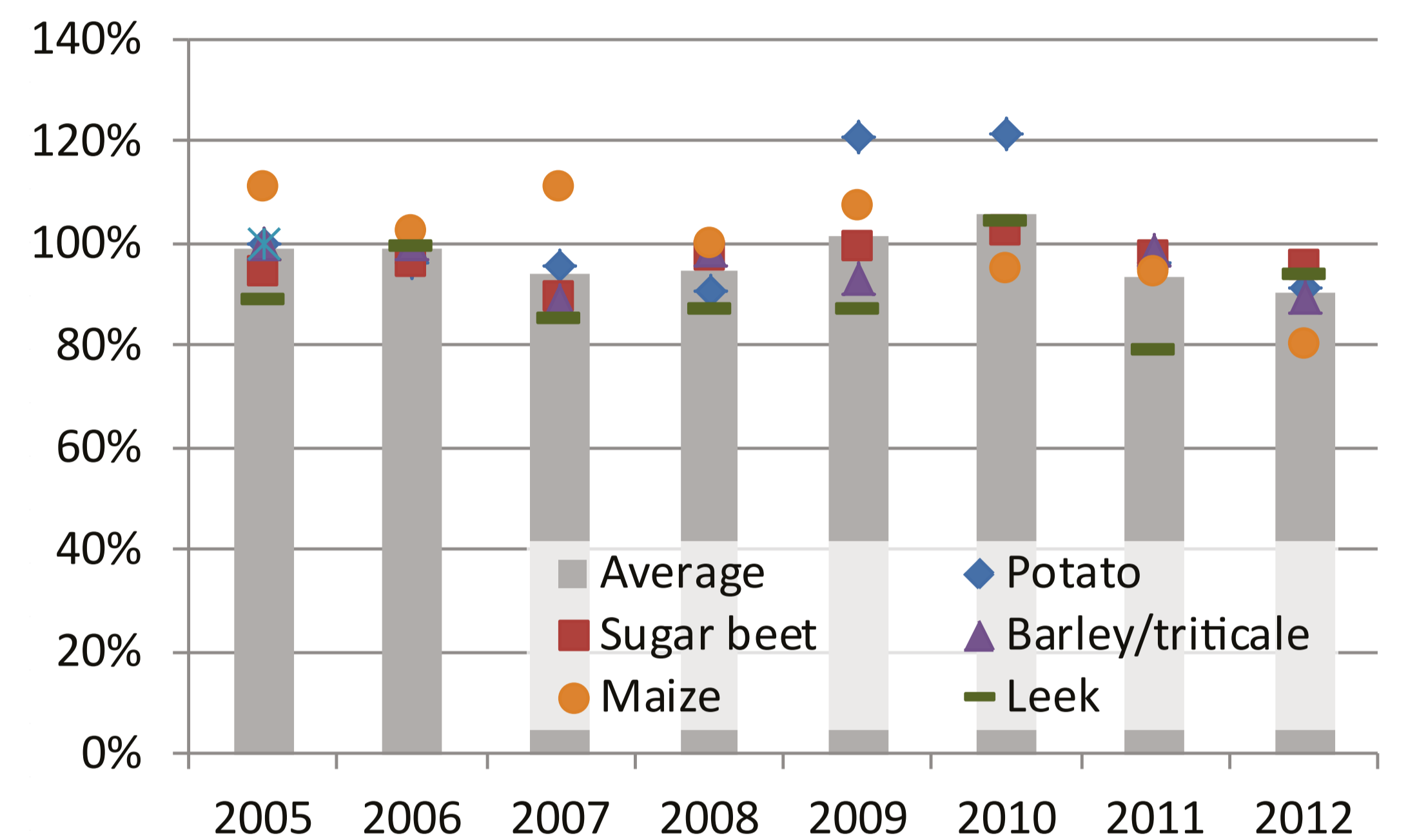
Yearly, marketable fresh yield were measured (2005-2012). Crop yields were compared with yields from commercial fields of the farm with same cultivar and cropping period (2005-2010). Nitrate concentrations in groundwater were measured four times each year in winter (2005-2008 and 2012). Soil characteristics are measured every 3-4 years

## Results and conclusions

- Differences in crop yields between RegularOM and LowOM is rising over years. However large variations occurs between years, crops and fields (Figure 1).
- Nitrate concentrations in groundwater are in LowOM 20 mg/l lower than in RegularOM between 2005 and 2008. In 2012 these levels are similar and at a much lower level (Figure 2).
- Differences between RegularOM and LowOM can be correlated to soil chemical characteristics as organic matter%, total nitrogen, P-Al (measurements 2011).
- Differences in crop yields between RegularOM and commercial production are 14% due to relative moderate fertilization levels in RegularOM (Figure 3).

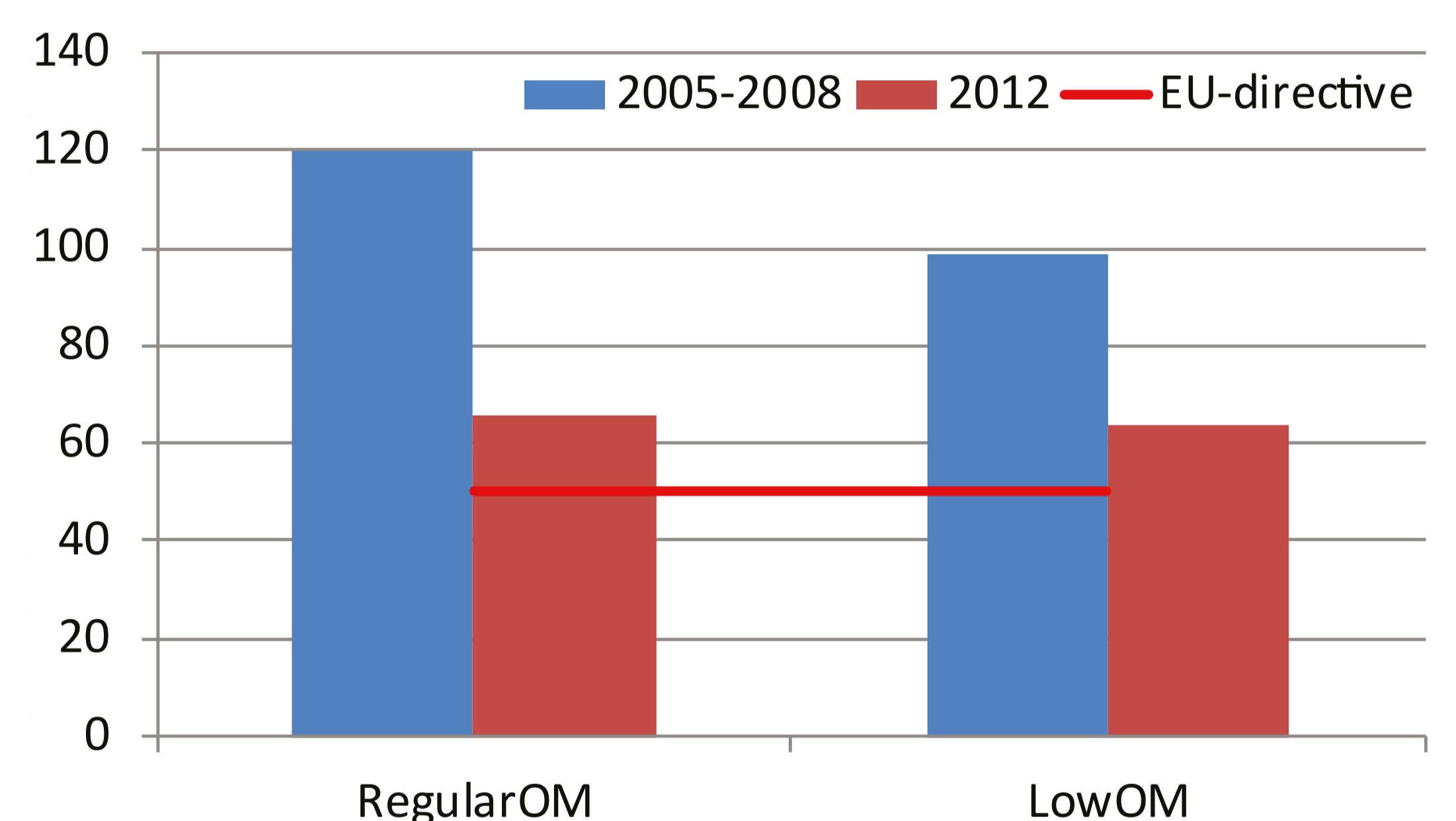
**Figure 1.**

Relative marketable crop yields 2005-2012 of Low OM compared to RegularOM.



**Figure 2.**

Nitrate concentrations in groundwater in mg nitrate/l, average values per system 2005-2008 and 2012



**Figure 3.**

Relative marketable crop yields 2005-2010 of Commercial Production compared to RegularOM.

