

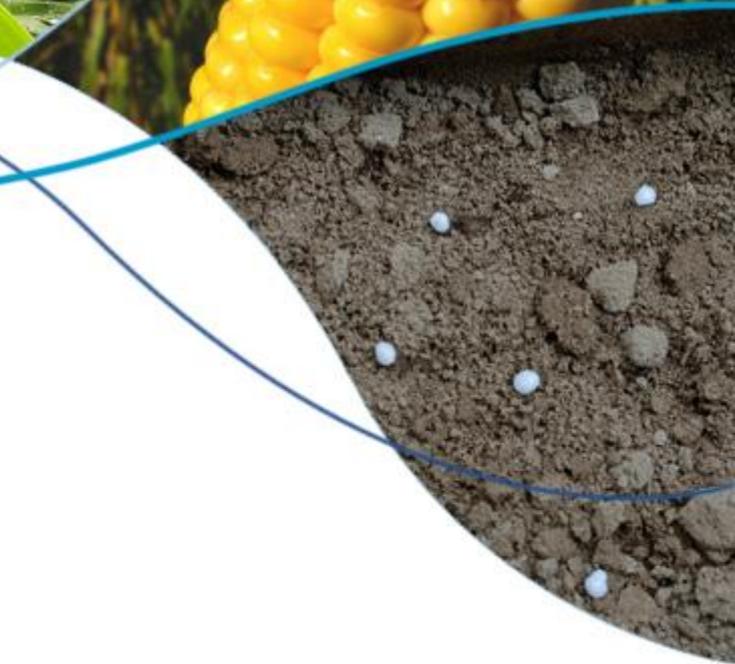


skw.
PIESTERITZ



PIADIN®

The nitrogen stabilizer for organic fertilisers



- » Fluid formulation of the active substance combination 1H-1,2,4-triazol and 3-methylpyrazol
- » Ph-value: 6-7
- » Density: 1.27 g/cm³
- » Start of crystallization: approx. -20 °C
- » Physical state: fluid
- » Colour: light yellow
- » Packaging:
 - 20l-canister, palletised, secured
 - 200l-drums, palletised, secured
 - IBC, 1000 l

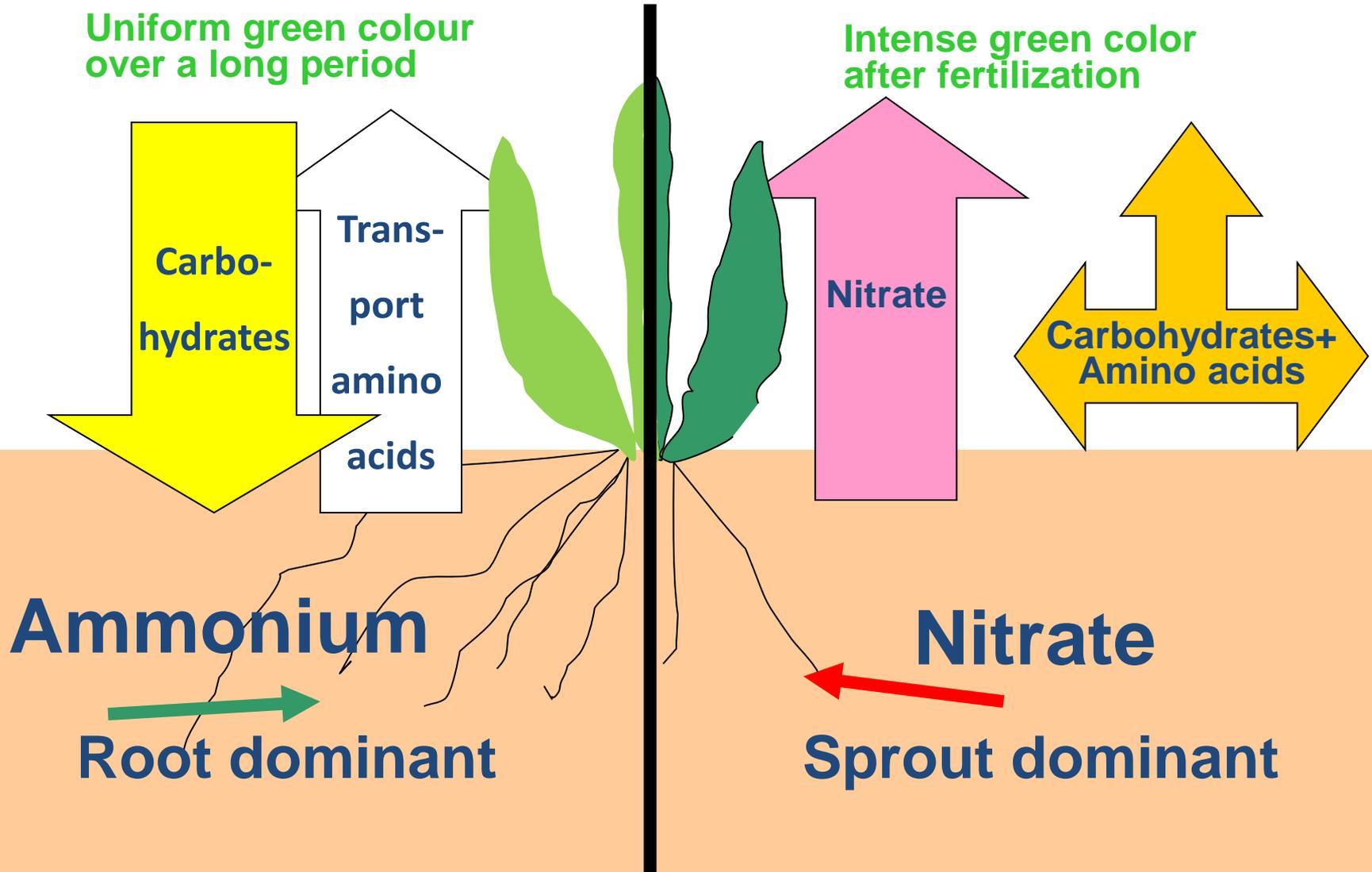
Packaging sizes

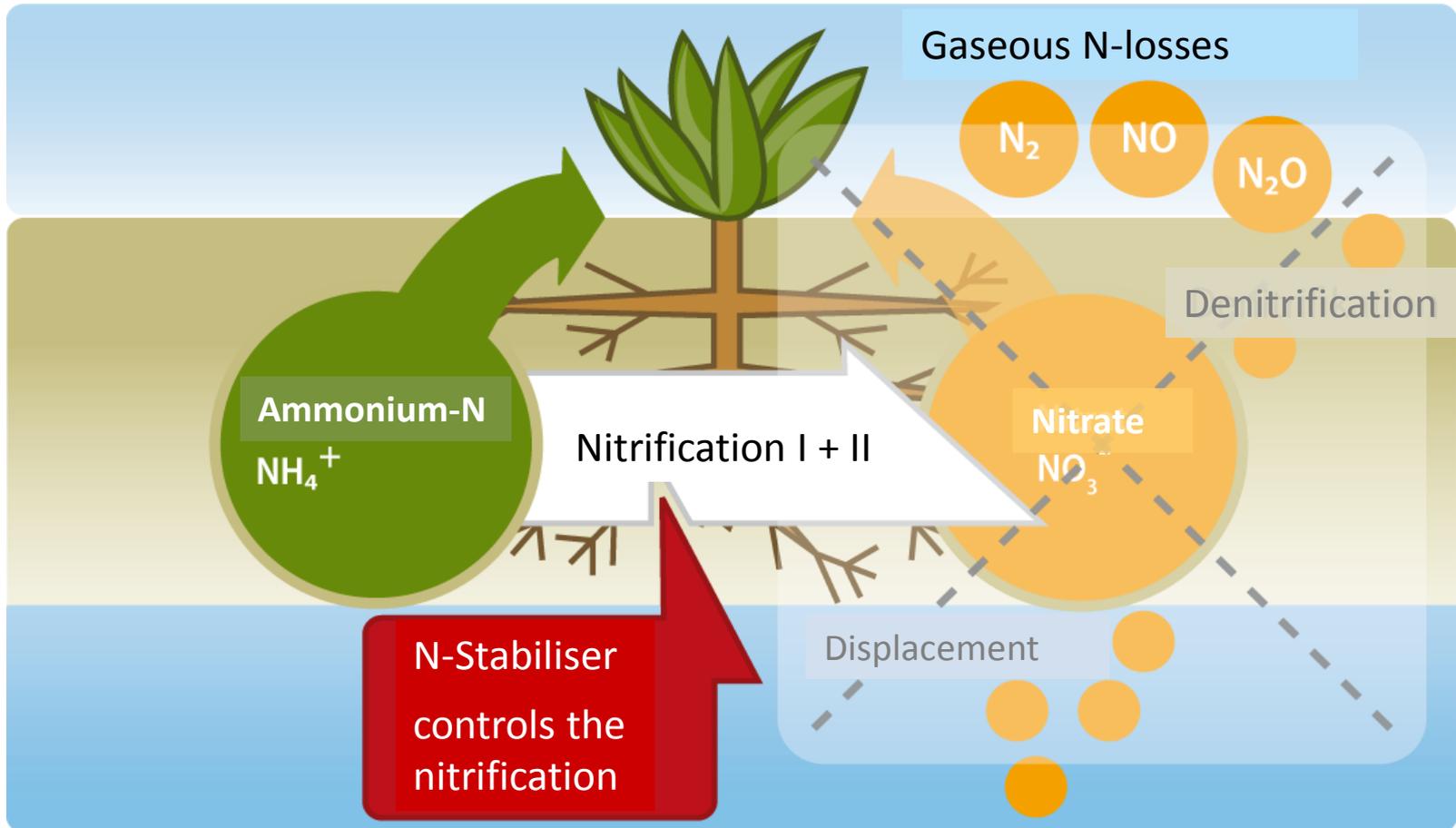


- » Nitrate nitrogen is passively absorbed by the water stream from the plant, stored in the cells and then renovated by high energy consumption from photosynthesis to ammonium nitrogen
 - Leaves dark green, because of higher chlorophyll
 - Risk of luxury consumption
 - stressed plant nutrition

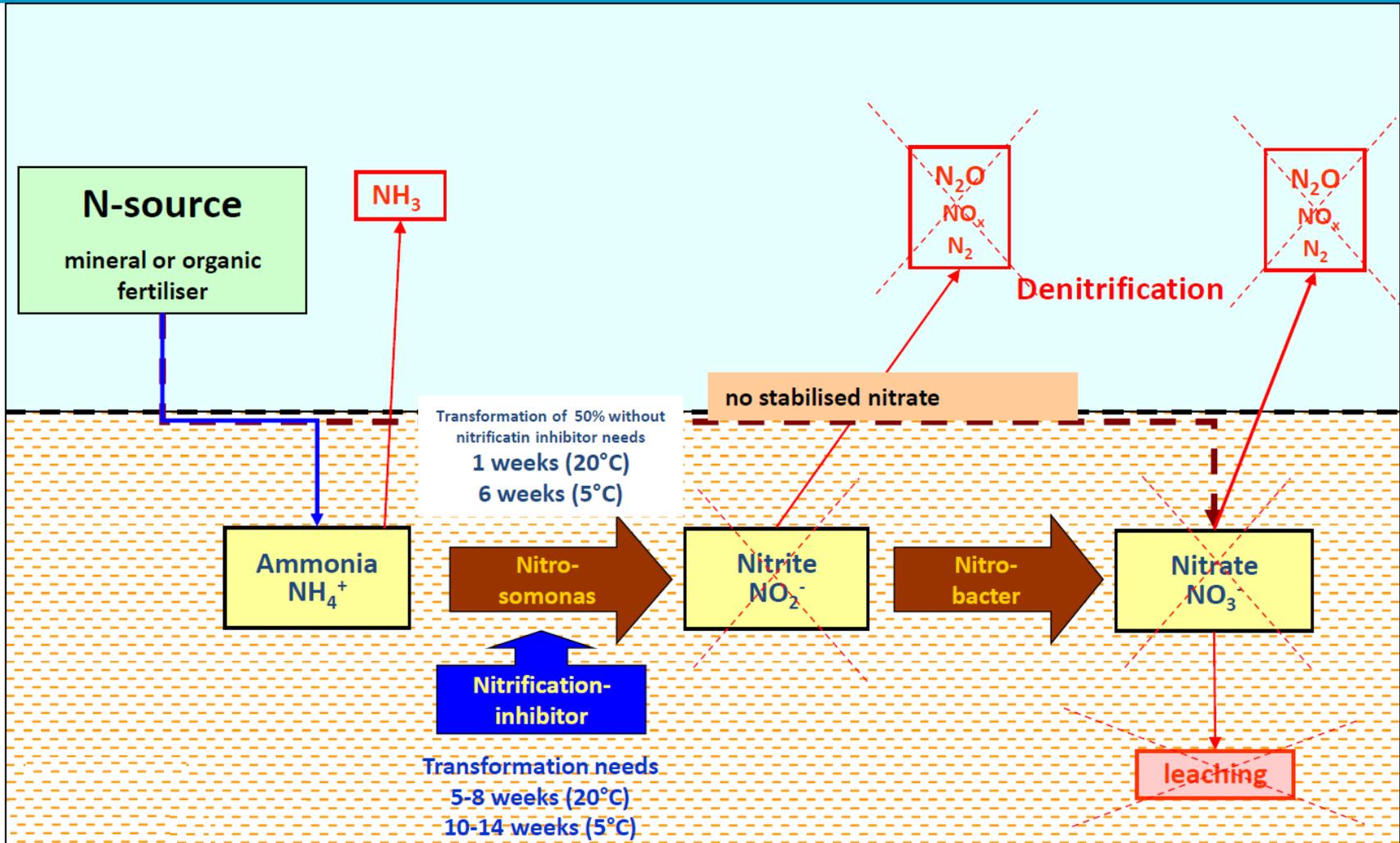
- » Ammonium nitrogen is actively absorbed to the root by diffusion (e.g. potassium) there it is used directly as ammonium for protein formation. For this purpose carbohydrates are provided from the plant
 - Efficient use of energy in metabolism
 - No luxury consumption because N uptake only during growth process
 - Promoting root growth
 - Increased uptake of phosphates and micronutrients by pH reduction in direct root area

Different nitrogen nutrition



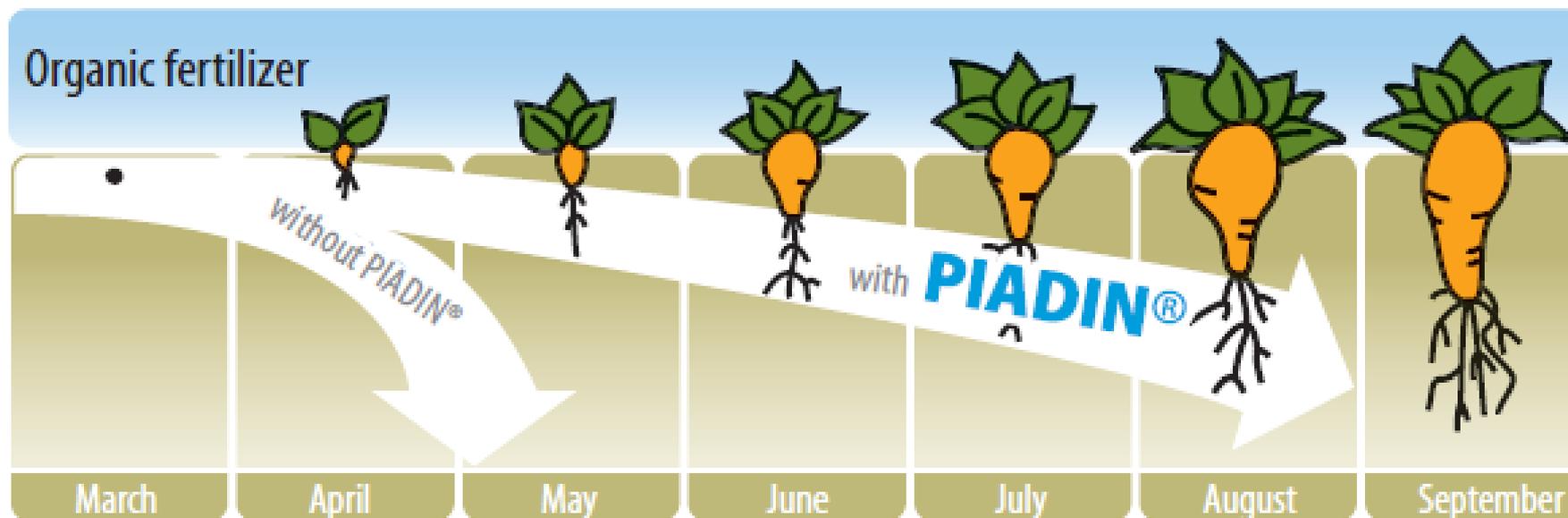


Mode of action of N-Stabilisers



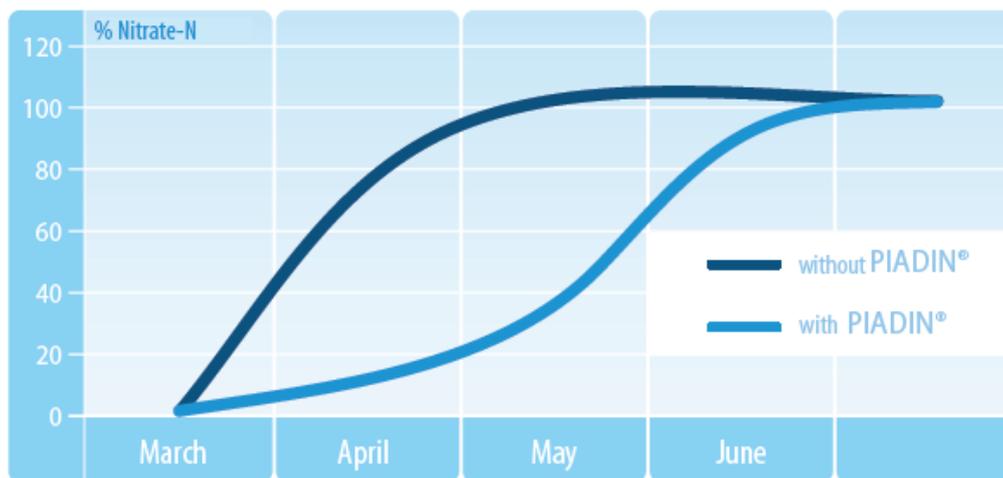
- » Nitrification inhibitors (NI) are accredited by law
- » Nitrification inhibitor slow down / delay the transformation to nitrate
- » Nitrification is never totally stopped – Ammonium is always present and small amounts of nitrate are available
- » In contrast to nitrate nitrogen - ammonium nitrogen is bound on soil particles and can not be leached out → ammonium nitrogen remains available to the plants in the root area for a long time
- » Use of property of NH_4^+ for plants and soil
- » Plants can use ammonium-N also like nitrate-N → no problem of availability
- » Higher N-efficiency – lower N-losses
- » Possibility for fertilisation of high N-amounts without problems
- » Suited for mineral as well as organic fertilisers

Principle of nitrogen stabilization:



- » PIADIN retards the conversion of nitrogen in organic fertilisers from stable ammonium to nitrate from 1-2 weeks to 4-8 weeks by
 - Ammonium-emphasized nutrition
 - Reduced risk of nitrogen losses
 - Availability of nitrogen at right time and at right place

PIADIN® retards nitrate formation.



- » Use with all **organic fertilisers** with high ammonium nitrogen content or in which nitrogen is mineralized rapidly (*e.g. liquid manures, residues from biogas systems, dry chicken droppings, bonemeal and harvest residues*)
 - » **Most advantageous: the more nitrogen is applied and the longer the interval between the organic fertiliser application and the greatest requirement for nutrient!!!**
 - » Application up to 160 kg/N ha from organic fertilisers at or shortly before start of vegetation e.g. in winter wheat and rape
 - » Application of organic fertilisers to root crops and maize on load-bearing soils as early as at the end of the winter until shortly before sowing
- early easement of pressure on liquid manure facilities and preservation of soil structure**

PIADIN® - Metering and application times

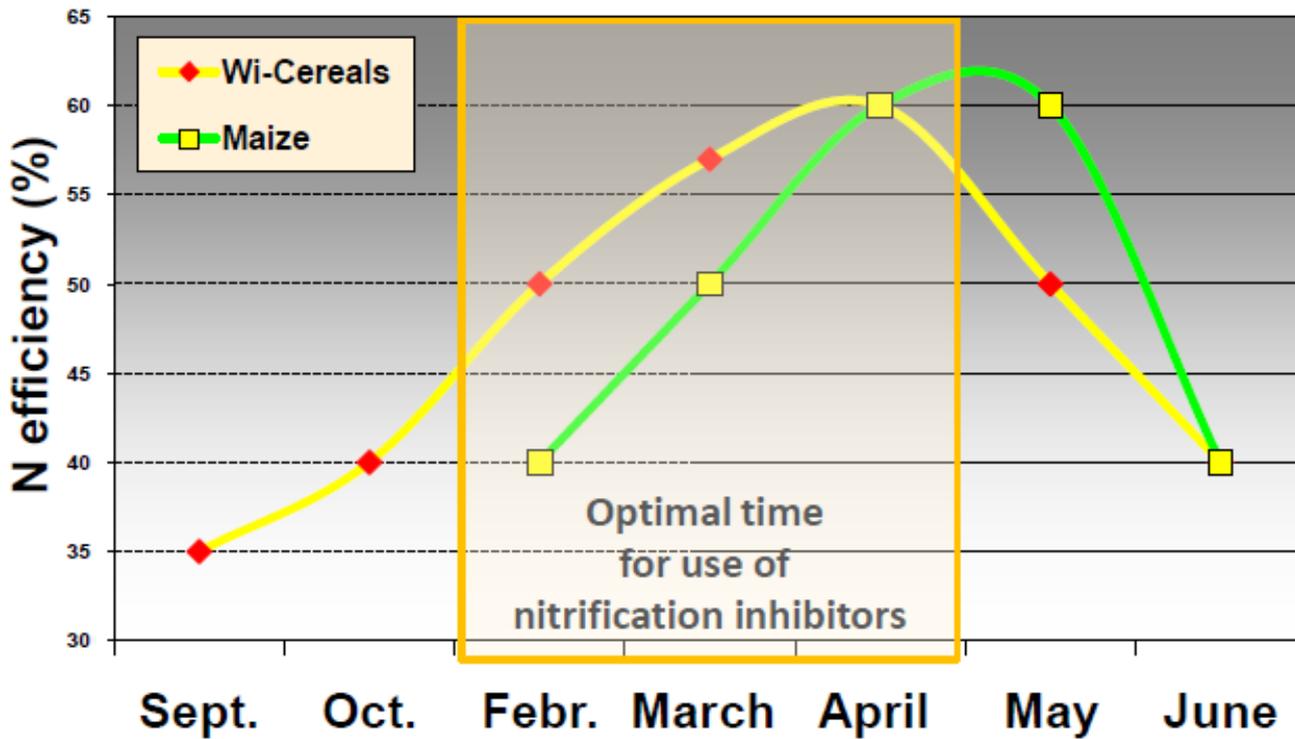
Quantities given in l/ha

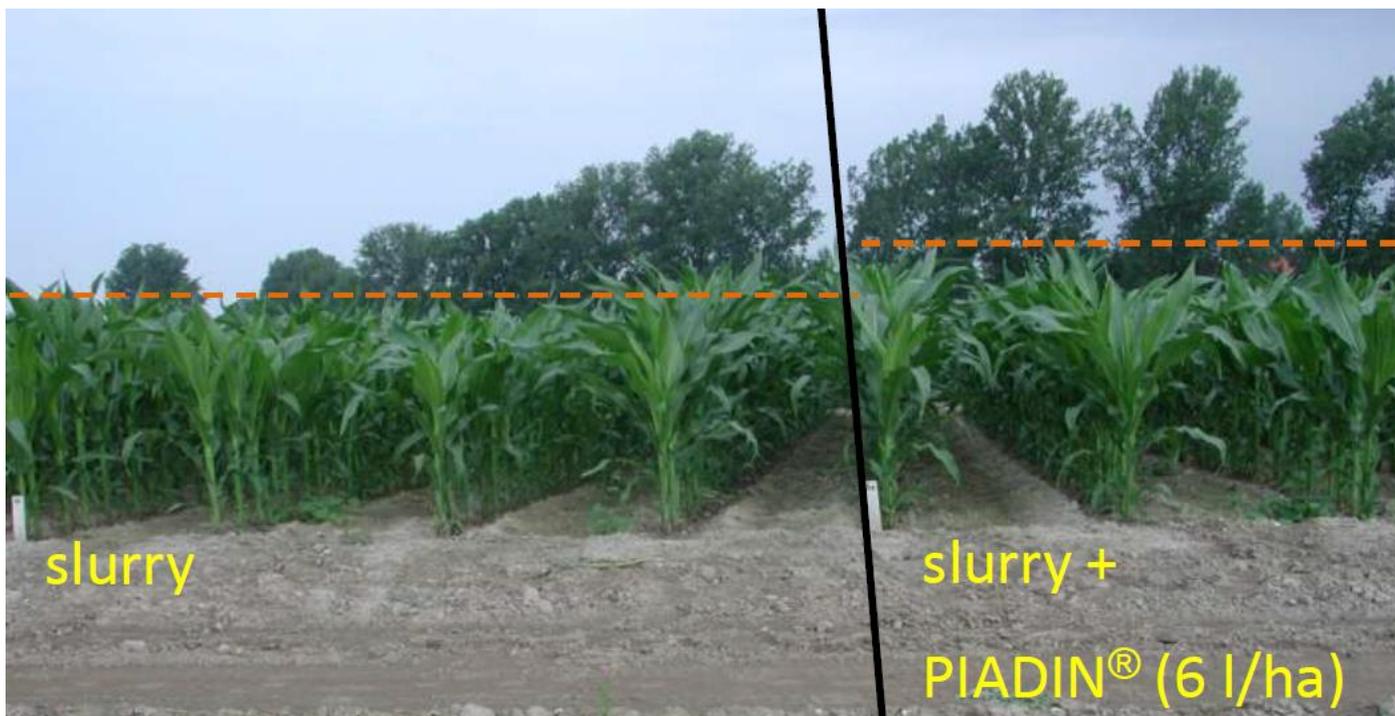
Crops	August– October	February	March	April
Maize, beet, potatoes	–	7	6	5
Grassland	–	5	4	-
Winter rye, winter barley, rape	5*	6	5	4
Winter wheat	5*	7	6	5
Harvest residue, e.g. after vegetable crop	8**	–	–	–

The closer the time of application is to the main N-absorption by the plants, the lower the quantity of PIADIN® that needs to be applied.

* To avoid over-growth of crops when natural manures are applied

** From October onwards



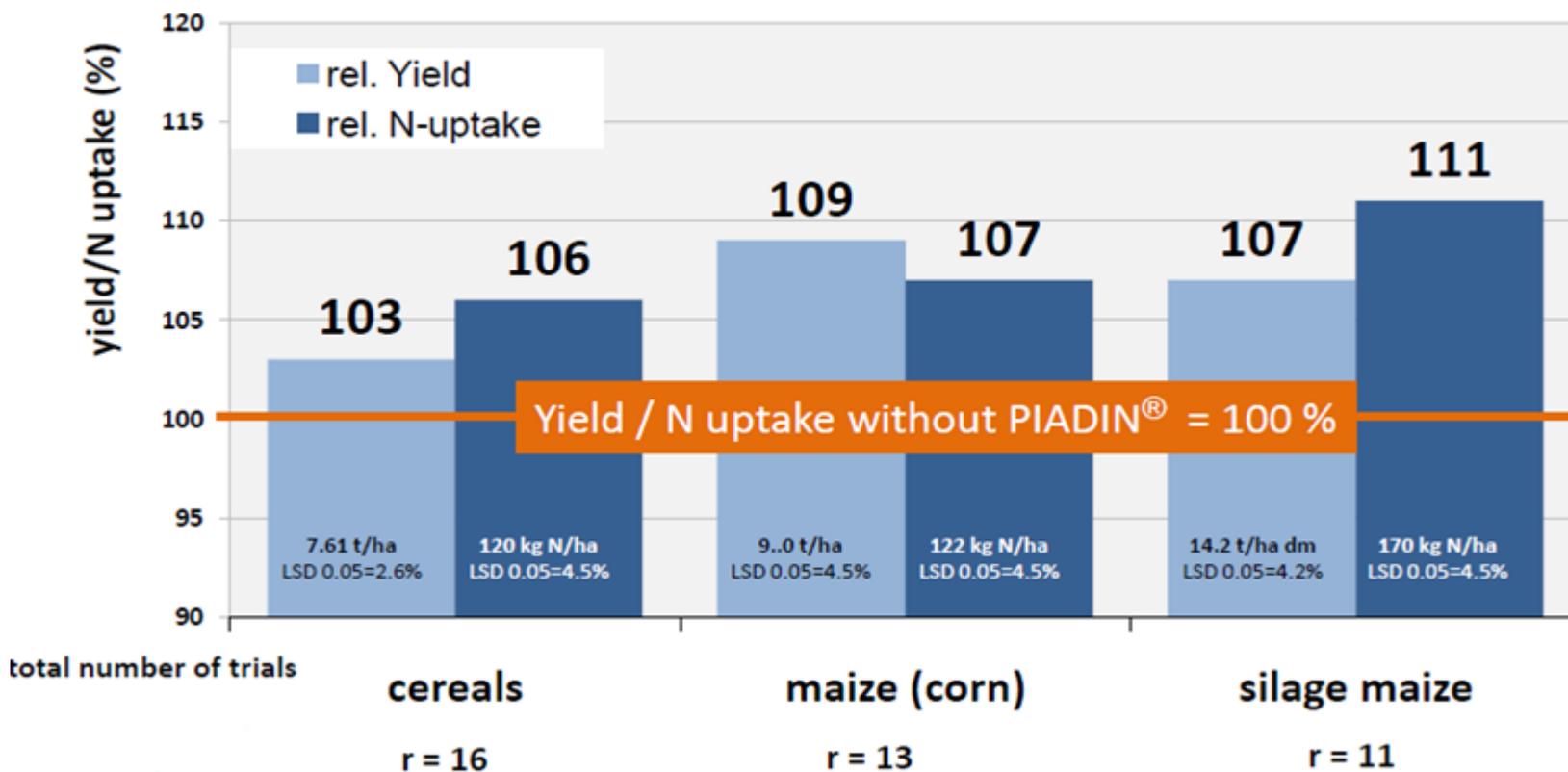


Yield (corn):

slurry	8.83 t/ha	9.76 t/ha
biogas residues	9.40 t/ha	10.00 t/ha

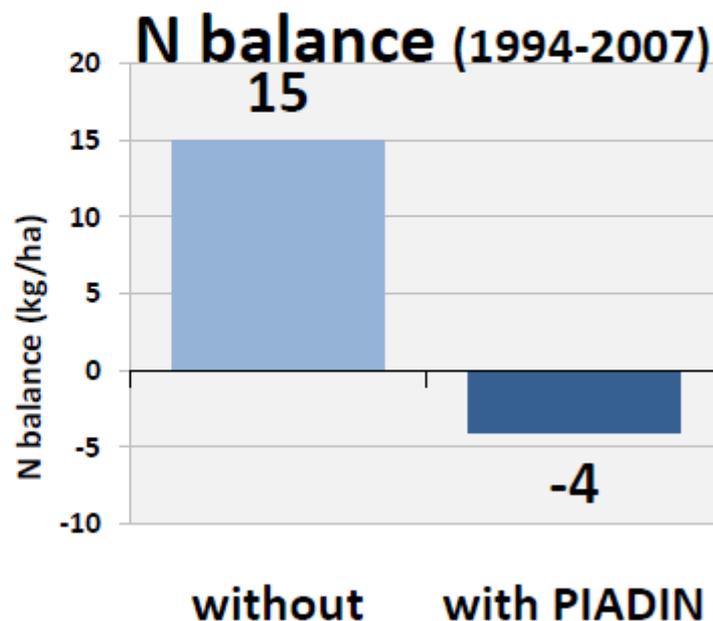
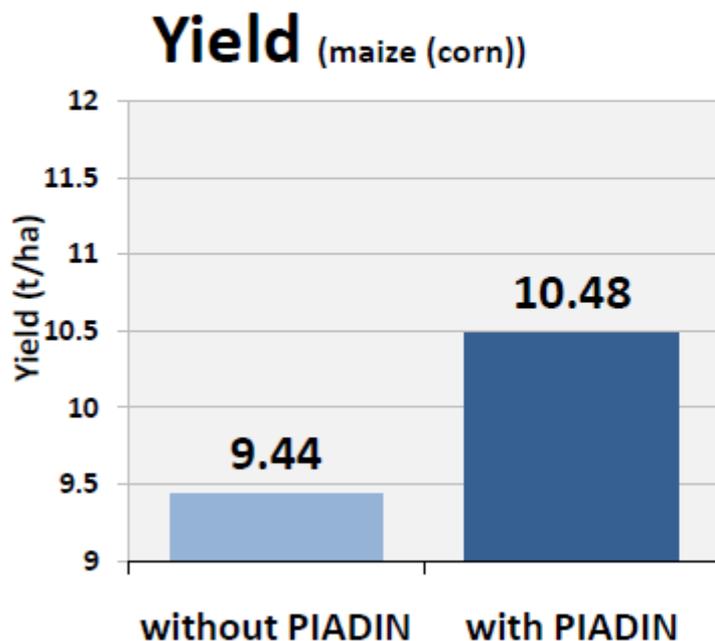
slurry application: March 19th 2009, 160 kg N/ha (NH₄-N) sowing of maize April 22nd 2009

Effect of PIADIN on yield and N uptake
 (relative compared to without PIADIN, mean 2003 - 2011)



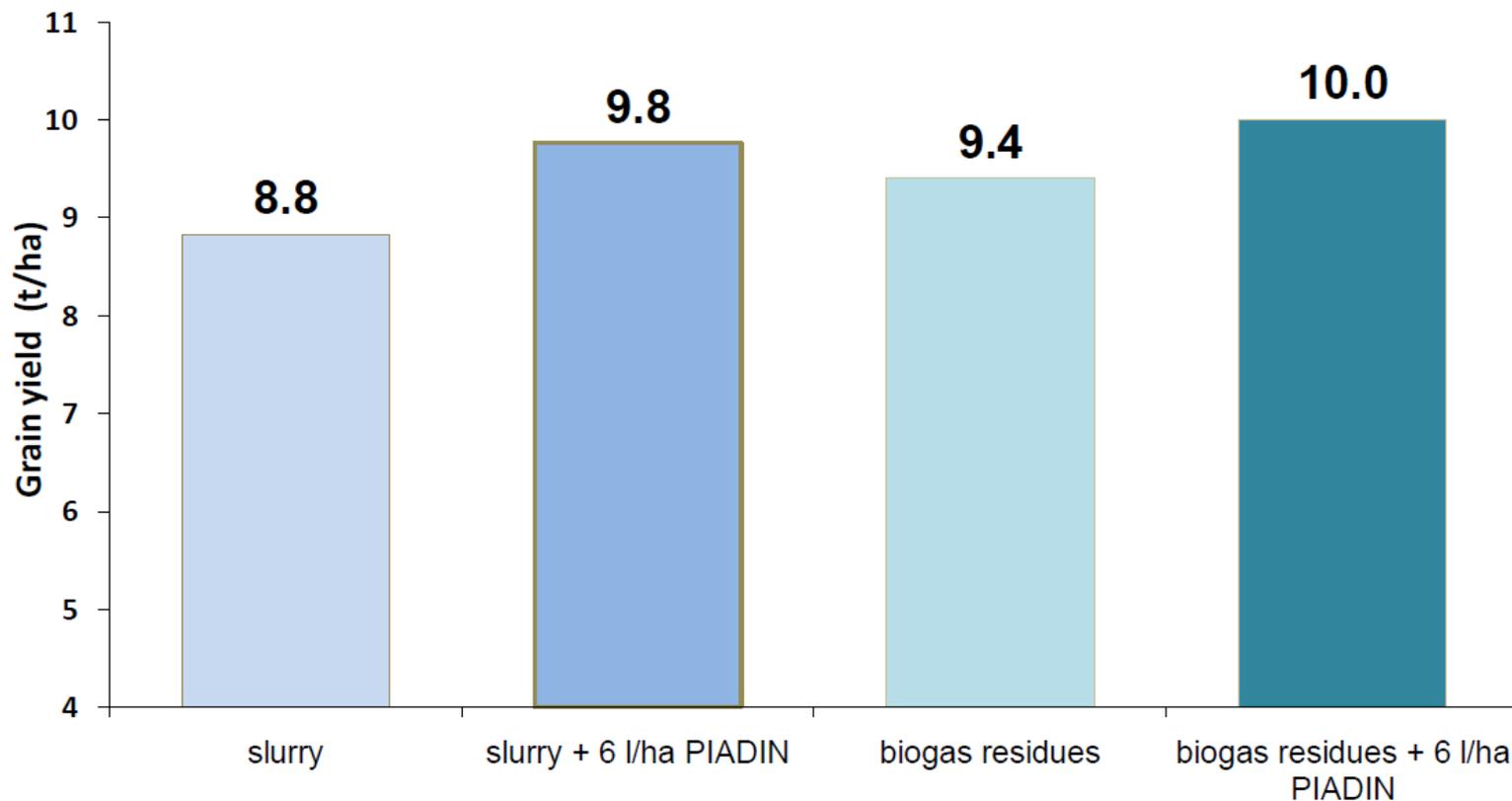
Effect of PIADIN on yield and N balance in long term trial 1994 - 2007

(University HLS Rotthalmünster , 1994-2005 using DIDIN®, 2006-2007 using PIADIN®)



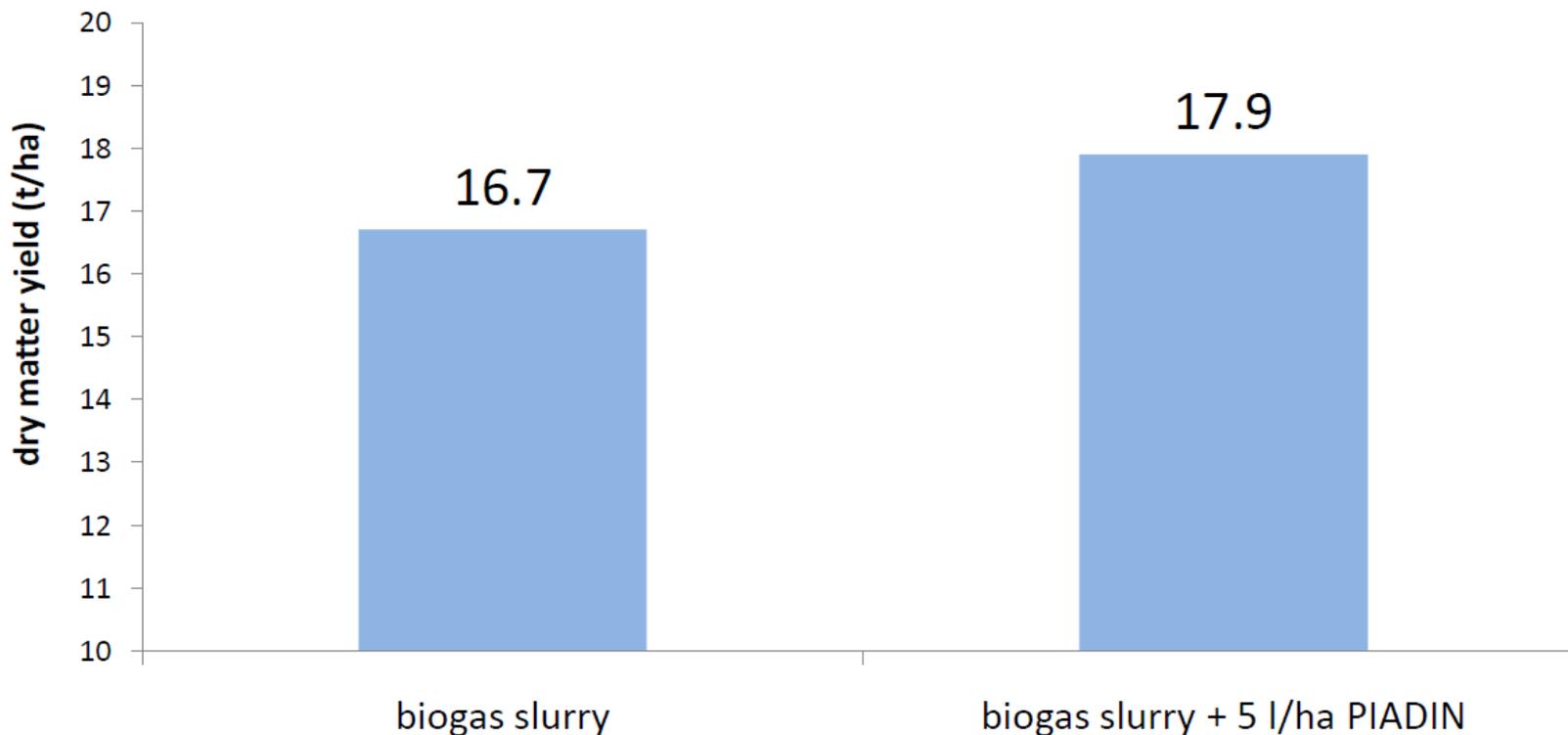
application of 30 m³/ha slurry (pig) before sowing of maize + 40 kg N/ha as NP-fertilizer combined with seed

experimental station Cunnersdorf (sandy loam) 2009



slurry application on March 19th 2009
Nitrogen amount 160 kg/ha NH₄-N

experimental station Ernstroda (Thuringia) 2011



slurry application on April 18th 2011
applied slurry amount 60 m³/ha

applied nitrogen: total amount 70 kg/ha N,
plant available amount 49 kg /ha N

experimental station Trossin (loamy sand) 2011
silage maize

fertilisation	dry matter yield t/ha	N uptake kg N/ha	N balance kg N/ha
slurry	17.9	198	-108
slurry + 5 l/ha PIADIN®	17.7	212	-122
LSD	1.13	14	

slurry application on April 8th 2011
applied slurry amount 30 m³/ha
Sowing of maize May 5th 2011

applied nitrogen: total amount 150 kg/ha N,
plant available amount 90 kg /ha N
slurry contained 0.34 % NH₄-, 0.50 % total N

Effect of biogas residues applied with PIADIN® on N uptake and N use efficiency growing silage maize

University of Munich, department of plant nutrition (2007)

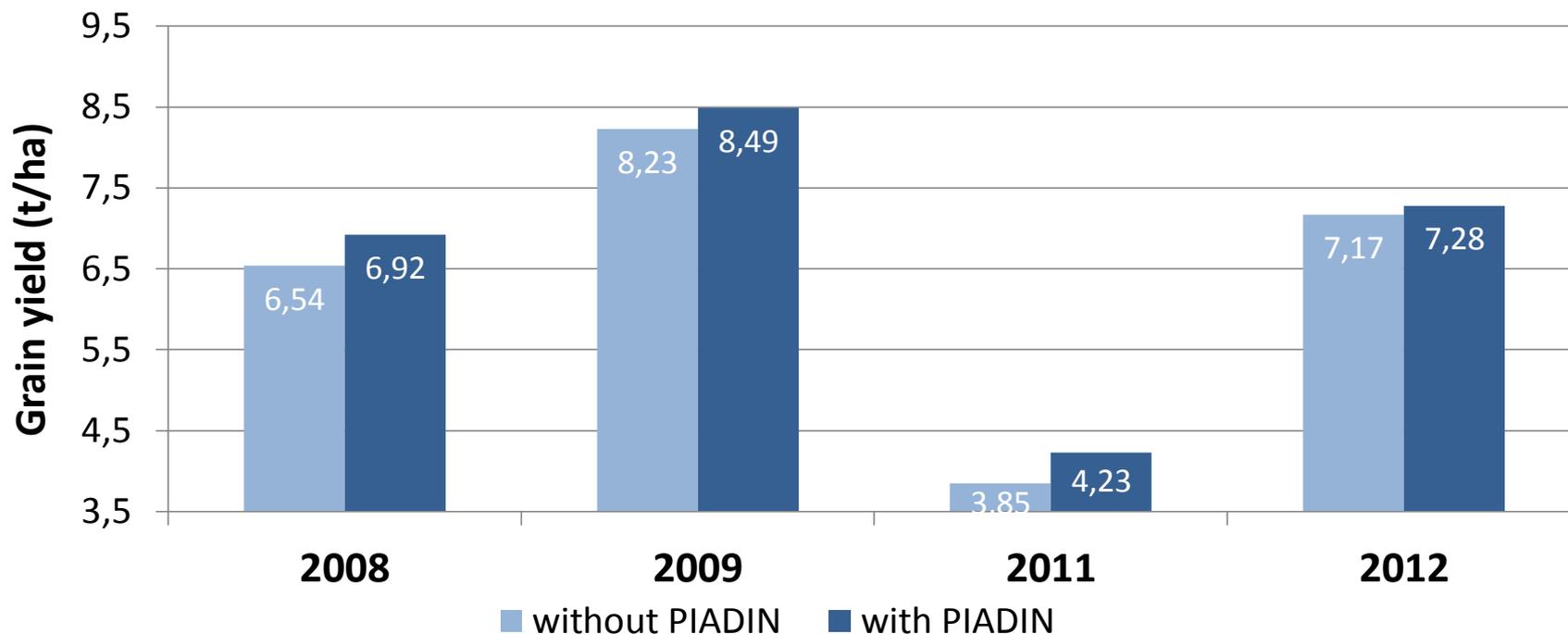
Residues of biogas*	N uptake (kg N/ha)	N use efficiency (%)	N utilization (%)
without biogas residues	132	-	-
superficial	166	31	38
Injection of biogas residues	219	78	95
injection + PIADIN®	227	86	105
ALZON 46 (urea + NI)	223	82	-

NI ... nitrification inhibitor

*dry matter content: 6,95 %, total N content: 6 kg/m³, NH₄-N amount: 3,1 kg/m³

N-fertilisation: 111 kg N/ha (NH₄-N as biogas residues)

Effect of PIADIN to slurry on grain yield of rye, Trossin (sandy loam) 2008 - 2012



2008

Application time: 13th Febr. (very early)
 Slurry-NH₄-N: 130 kg/ha N
 PIADIN amount: 6 l/ha

2009

Application time: 18th March
 Slurry-NH₄-N: 171 kg/ha N
 PIADIN amount: 5 l/ha

2011

Application time: 28th March
 Slurry-NH₄-N: 150 kg/ha N
 PIADIN amount: 7 l/ha

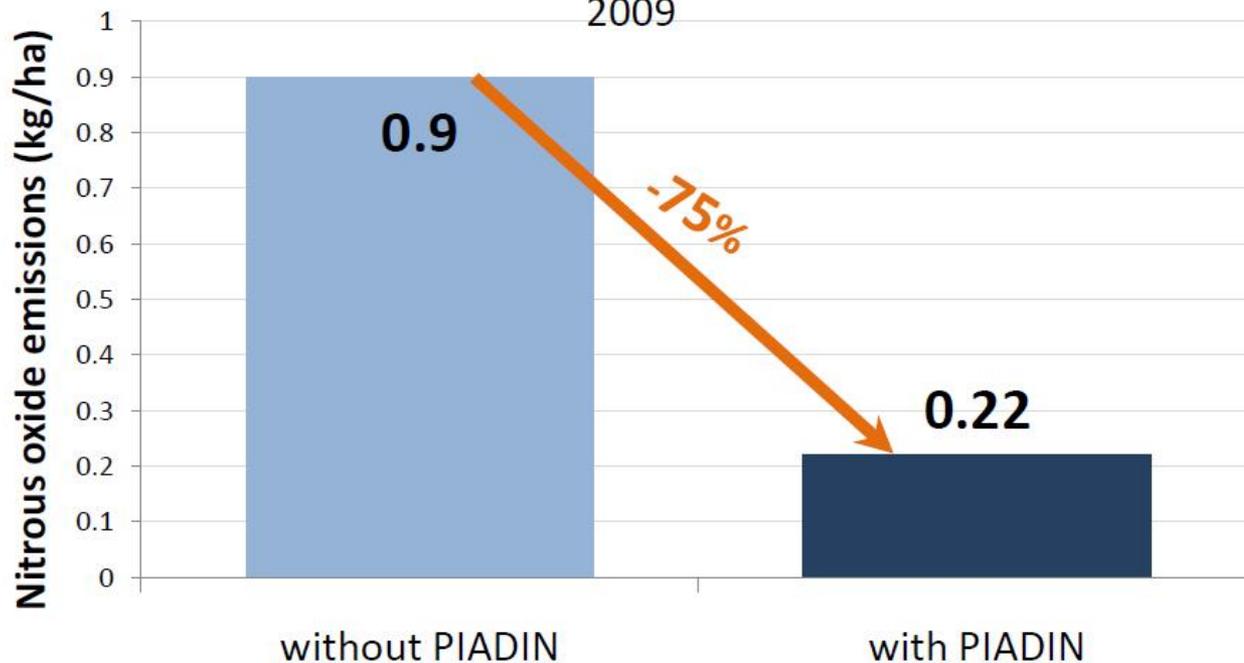
2012

Application time: 16th March
 Slurry-NH₄-N: 150 kg/ha N
 PIADIN amount: 5 l/ha

Application of biogas residues without and with PIADIN

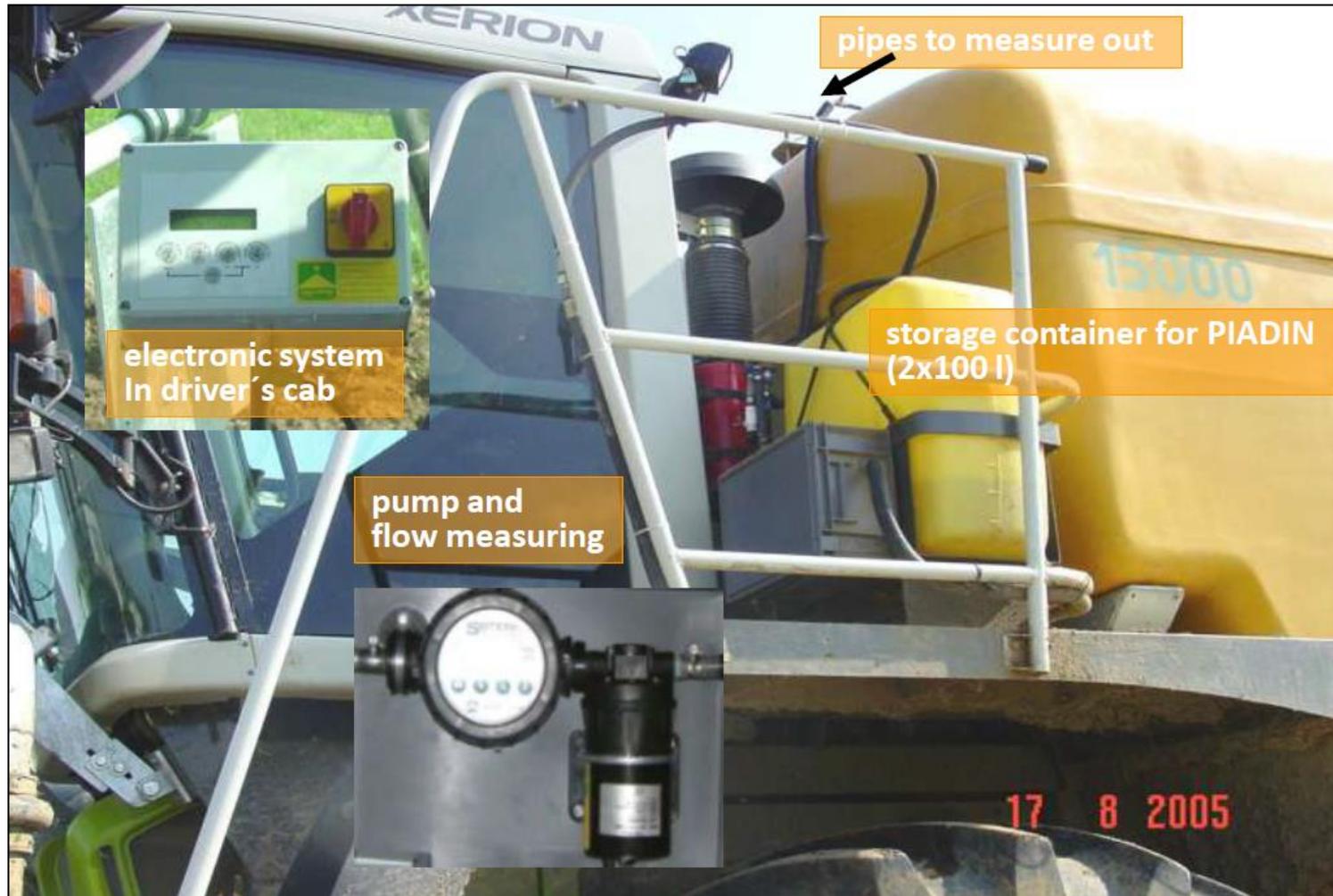
Results of trials in containers

University of Munich, department of plant nutrition
2009



PIADIN® - adding to slurry via bypass





- » Use of PIADIN® related to the area (litre of PIADIN per area)
- » PIADIN® has to be mixed prior to application with slurry
- » Benefits of PIADIN® use are:
 - Increased yield (mean cereals 3%, maize 7-9%)
 - Increased N uptake (mean cereals 6%, maize 7-11%)
 - Improved nitrogen use efficiency of applied slurry
 - Improved N balances of plant production
- » PIADIN®
 - Decreases risk of leaching losses of nitrate
 - Reduces losses (>50%) of nitrous oxide (N₂O) and losses of molecular nitrogen (N₂) in course of denitrification
- » The benefit will grow if the time between application of slurry and main demand of nitrogen by the plant is increased (maize)

- » Environmentally-friendly organic fertiliser application and increased nutrient efficiency thanks to the clearly reduced risk of nitrogen losses
- » Greater economy thanks to the integrating of liquid manure part administrations to achieve one single fertiliser application in the early part of the year
- » Application can be brought forward, which means avoiding work peaks and eases the pressure on storage space
- » Helps preserve the soil structure and reduces ammonia losses thanks to early application on load-bearing soils
- » High yields and good quality thanks to the balanced nitrogen supply, perfect for the requirement
- » Reliable avoidance of undesirable “luxury” consumption and reduced risk of lodged grain and incidence of pests
- » Easy handling thanks to simple mixing or application with conventional plant protection technology