



# Vizura<sup>®</sup>

Enhancing the value  
of your slurry and digestate

**Nitrification inhibitor  
for slurry and digestate**

 **BASF**

We create chemistry



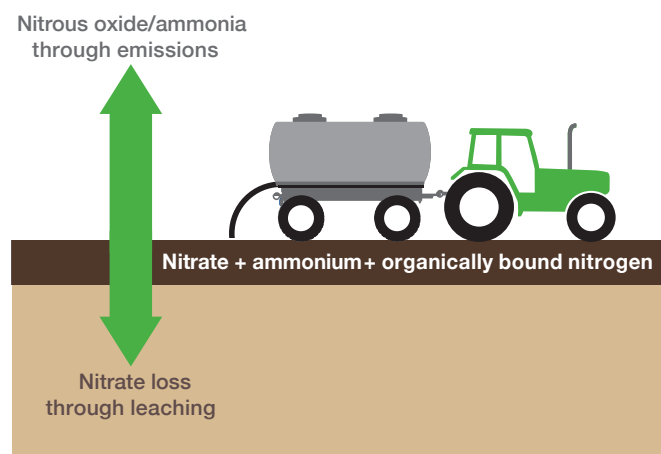


## ARE YOU UTILISING THE FULL POTENTIAL OF YOUR SLURRY AND DIGESTATE?

Slurry and biogas digestate are valuable complex fertilisers. The available nitrogen needs to be taken up and used by plants as efficiently as possible, making it important to prevent the loss of nutrients associated with fertilisation.

Vizura® keeps the nitrogen from slurry and digestate in the ammonium form for longer, reducing losses and ensuring the nitrogen is available to crops when they need it. This is valuable for both farmers and the environment.

### Nitrogen losses during fertilisation



### Avoiding nitrogen loss

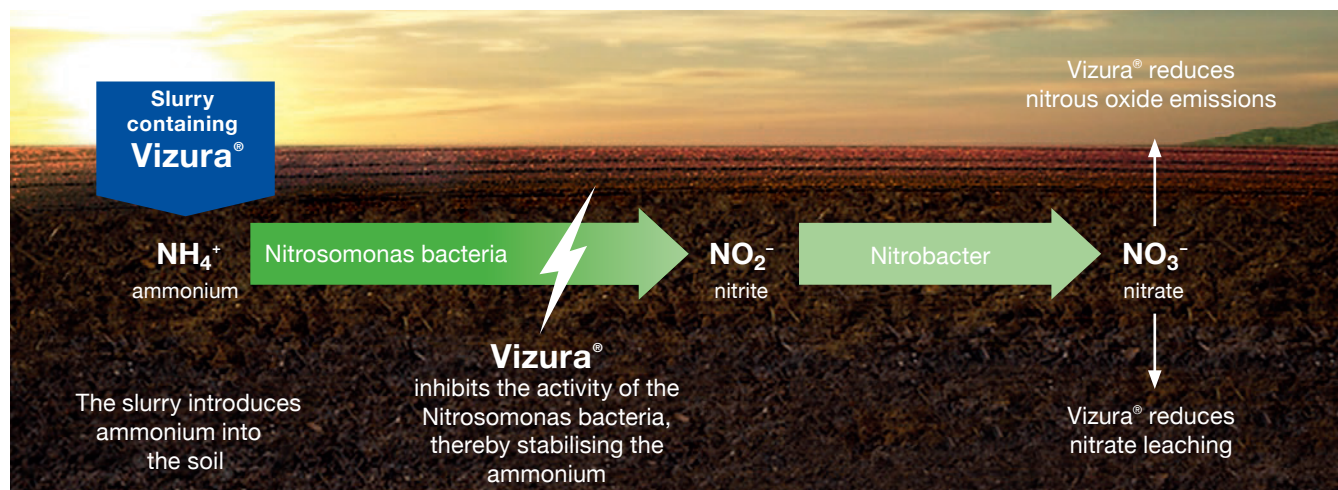
Significant amounts of nitrogen are lost during and after the spreading of slurry and digestate. This nitrogen can be lost as ammonia and nitrous oxide into the atmosphere or through nitrate leaching.

Depending on environmental conditions post application, such as temperature, soil moisture and soil conditions, the ammonium from the slurry and digestate is converted into nitrate. As this nitrate is mobile in the soil, it can move easily to the lower soil layers and finally into the groundwater.

BASF has developed the nitrification inhibitor, Vizura®, a nitrogen stabiliser, to reduce nitrogen losses.



## How Vizura® works



Nitrosomonas bacteria convert the ammonium from slurry and digestate into nitrite. Nitrobacter convert the nitrite into nitrate, which can then be lost through nitrate leaching, or to the atmosphere as nitrous oxide emissions.

Vizura® slows down the conversion of ammonium to nitrite by inhibiting the action of the Nitrosomonas bacteria. This keeps the level of ammonium stable for a longer time.

Vizura® reduces the risk of both nitrate leaching and nitrous oxide emissions and offers nutritional benefits to the crop.

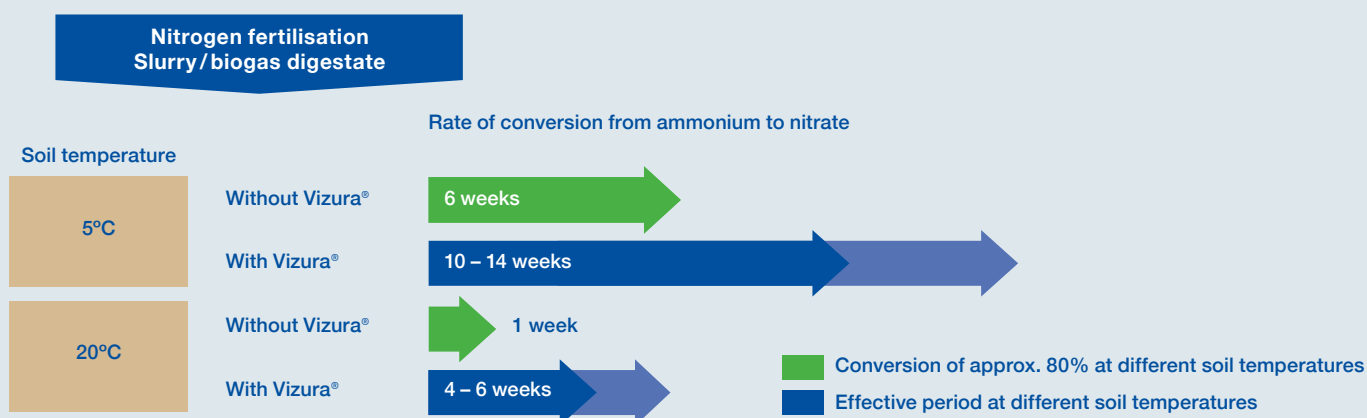
Nitrogen stabilisation is particularly effective when the slurry is applied before sowing. Crops can continue to take advantage of the available nitrogen for several weeks after application, when crop demand is highest.

The nitrogen stabilisation provided by Vizura® allows for earlier slurry application that can ensure optimum soil conditions and allow the grower to simplify farm operations.

Using Vizura® can lead to higher yields and reduces the need for additional mineral fertiliser application.

The image below shows how long Vizura® inhibits the conversion of ammonium to nitrate at different temperatures.

## Vizura® keeps nitrogen in the ammonium form for longer



At low soil temperatures (5°C), the ammonium nitrogen is converted into nitrate in around 6 weeks. Vizura® extends this period considerably to around 10 – 14 weeks. At 20°C, the rate increases to around one week, and can be extended to around 4 – 6 weeks with Vizura®.





## HOW CAN VIZURA® BE TESTED IN THE FIELD?

Vizura® improves the nitrogen use efficiency of slurry and digestate by stabilising nitrogen in the ammonium form over several weeks and thus reducing nitrogen losses.

The performance of DMPP, the active ingredient in Vizura®, has been widely proven but how is it tested in the field?

One approach is the use soil cores. This approach allows precise applications of slurry with and without Vizura®. The soil cores can then be removed at different intervals following application and their contents assessed in a laboratory for the presence of both ammonium and nitrate. In the UK, a comprehensive 'wave trial' was set up in conjunction with SynTech Research using this method.

### Trial set up

**Step 1: Trench dug and soil cores set up at 10cm depth**



**Step 2: Fresh digestate with and without Vizura® applied**



**Step 3: Soil cores covered and left for specified time period**



**Step 4: Soil cores removed and contents frozen prior to shipping and soil testing**



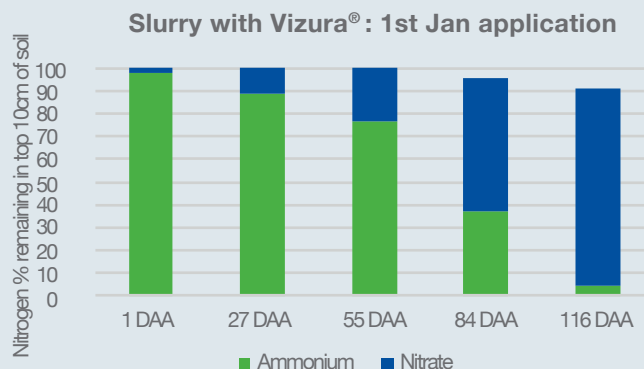
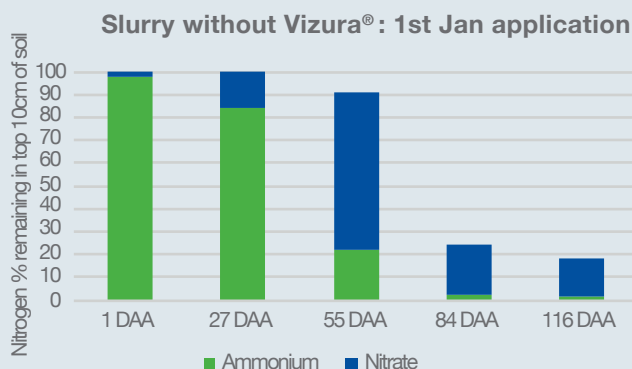


## January application

Slurry with and without Vizura® was applied on 1st January into 20 soil cores. At different time intervals (DAA: Days after application), four soil cores were removed and their contents analysed for the total amount of nitrogen present and the percentage of which was ammonium and nitrate respectively.

The time intervals were:

- 2nd January (1 DAA)
- 28th January (27 DAA)
- 25th February (55 DAA)
- 26th March (84 DAA)
- 27th April (116 DAA)

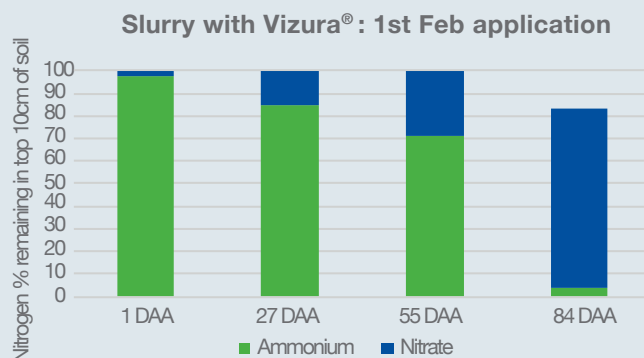
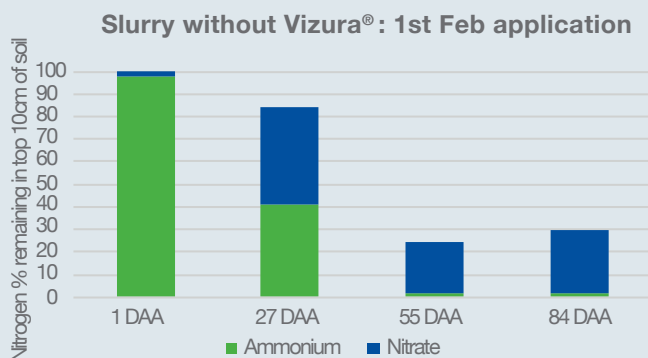


## February application

Slurry with and without Vizura® was applied on 1st February into 20 soil cores. At different time intervals after application (DAA: Days after application), four soil cores were removed and their contents analysed for the total amount of nitrogen present and the percentage of which was ammonium and nitrate respectively.

The time intervals were:

- 2nd February (1 DAA)
- 28th February (27 DAA)
- 28th March (55 DAA)
- 26th April (84 DAA)



## Results

As shown by the charts above, Vizura® kept the nitrogen in the ammonium form for longer and retained a higher total amount of nitrogen in the soil core (top 10cm of soil).

In the January application trial, Vizura® helped to keep more than 90% of the nitrogen in the top 10cm of the soil by the end of April (116 DAA). Without Vizura®, less than 20% remained.

In the February application trial, Vizura® helped to keep more than 80% of the nitrogen in the top 10cm of the soil by the end of April (84 DAA). Without Vizura®, less than 30% remained.

The nitrogen retained by Vizura® can then be utilised by the crop once growing conditions are more conducive for growth at the end of April.





## HOW DOES VIZURA BENEFIT CROPS?

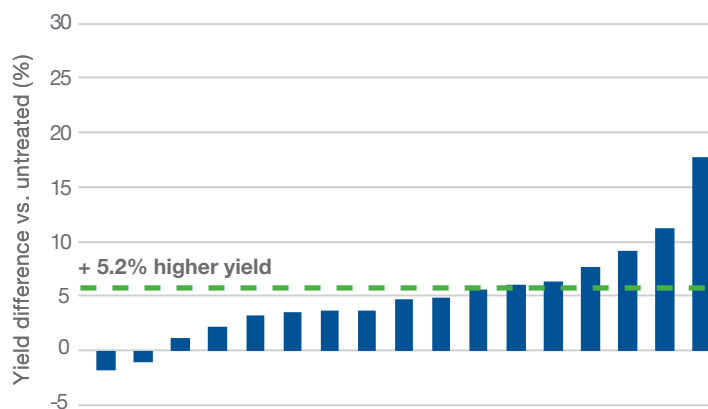
Nitrogen is essential for plant growth and is a decisive factor in achieving good harvest results. Adding Vizura® to slurry or digestate improves its nitrogen use efficiency, increasing yield and reducing the need for additional mineral fertiliser application.

In addition, Vizura® prolongs the availability of ammonium in the ground, which in turn results in improved and continuous nutrition for plants.

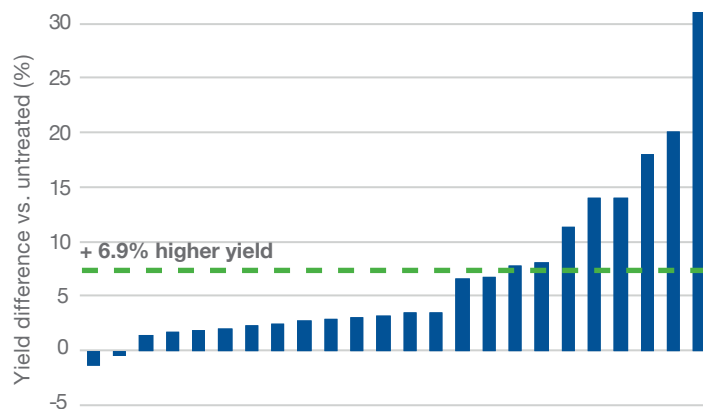
### Vizura® increases yield

By keeping nitrogen in the ammonium form for longer and thus reducing nitrogen losses, more nitrogen is available to the crops and greater yields can be achieved. Vizura® has been proven to increase yields across many crops and the below charts show the use of Vizura® resulting in a 5% yield increase in wheat and a 7% yield increase in maize.

**WINTER WHEAT: Yield increase (%)  
from Vizura® - 17 trials, BASF**



**MAIZE: Yield increase (%)  
from Vizura® - 24 trials, BASF**



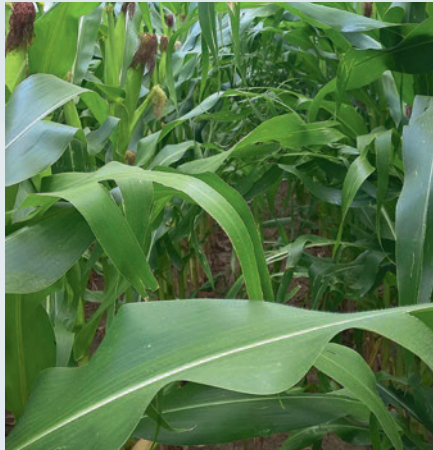


## Advantages of ammonium-based plant nutrition

Essentially, plants are able to use both ammonium and nitrate to grow. By adding Vizura® to slurry and bio-gas digestate, the nitrogen remains in the ammonium form for longer, offering several nutritional benefits to crops.

In addition, ammonium cannot leach from the soil like nitrates do. Under many conditions, the ammonium nitrogen nutrition can result in the following advantages.

### Experiment at Weihenstephan University of Applied Sciences, 2015

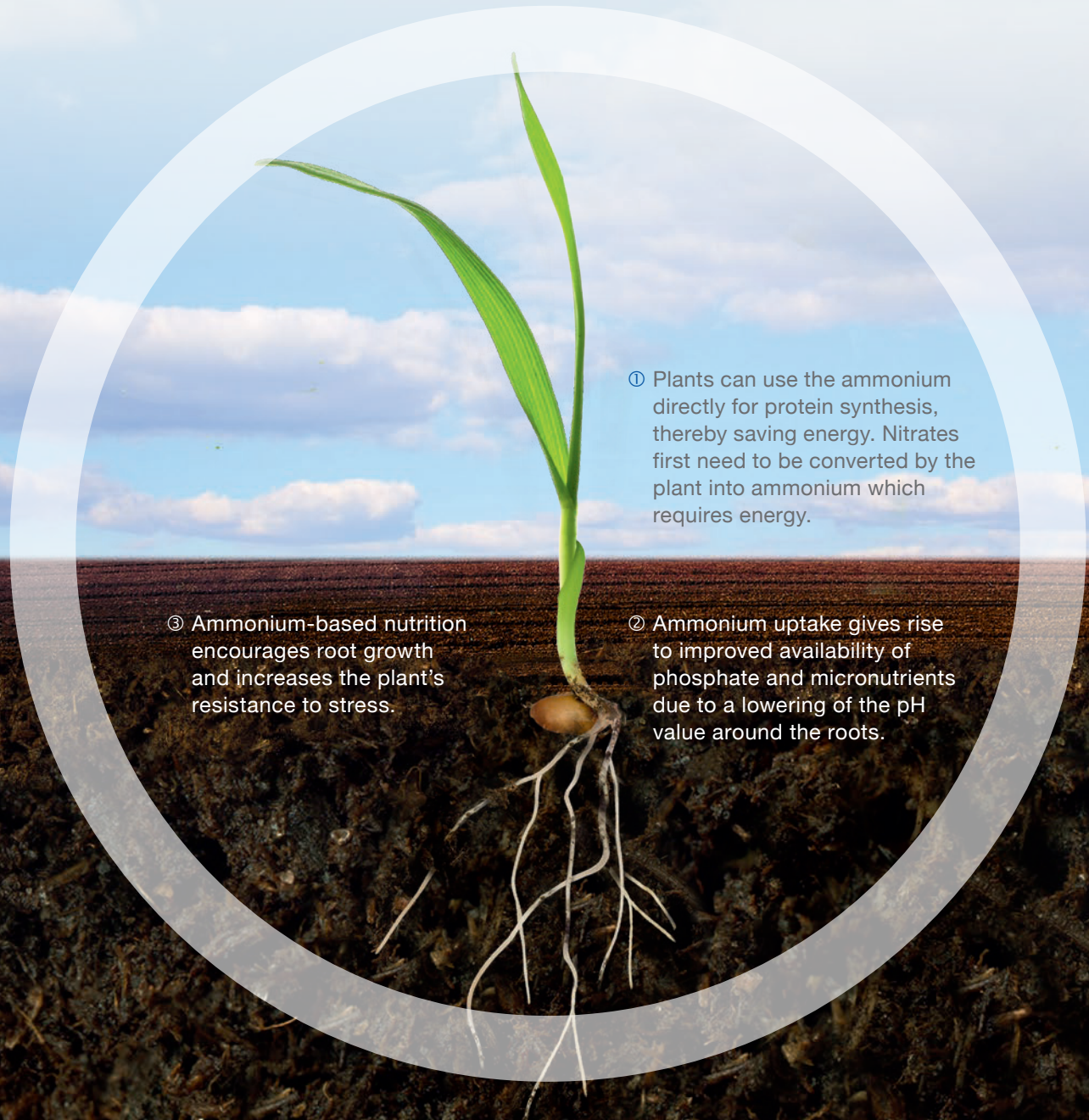


Without Vizura®



With Vizura®

Source: Jochen Hübler, July 27, 2015, Weihenstephan University of Applied Sciences



① Plants can use the ammonium directly for protein synthesis, thereby saving energy. Nitrates first need to be converted by the plant into ammonium which requires energy.

② Ammonium uptake gives rise to improved availability of phosphate and micronutrients due to a lowering of the pH value around the roots.

③ Ammonium-based nutrition encourages root growth and increases the plant's resistance to stress.





## HOW DOES VIZURA® BENEFIT THE ENVIRONMENT?

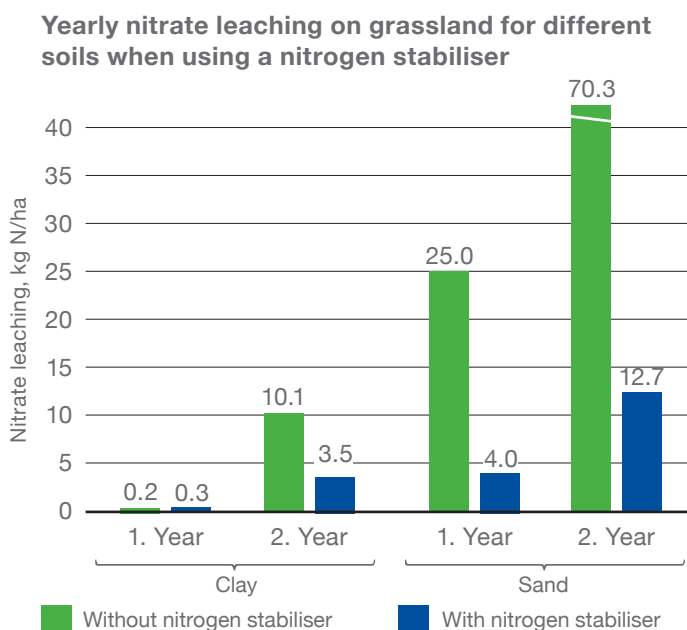
Vizura® reduces nitrogen losses by keeping nitrogen in the ammonium form for longer. The result? Improved nitrogen use efficiency.

A sustainability evaluation of Vizura® using the AgBalance™ tool has shown that the use of Vizura® improves the sustainability of slurry. This is due to less nitrogen being lost via leaching.

Vizura® contains the active ingredient DMPP. The below study found that DMPP reduced nitrous oxide emissions by 45%.

### Vizura® reduces nitrate leaching

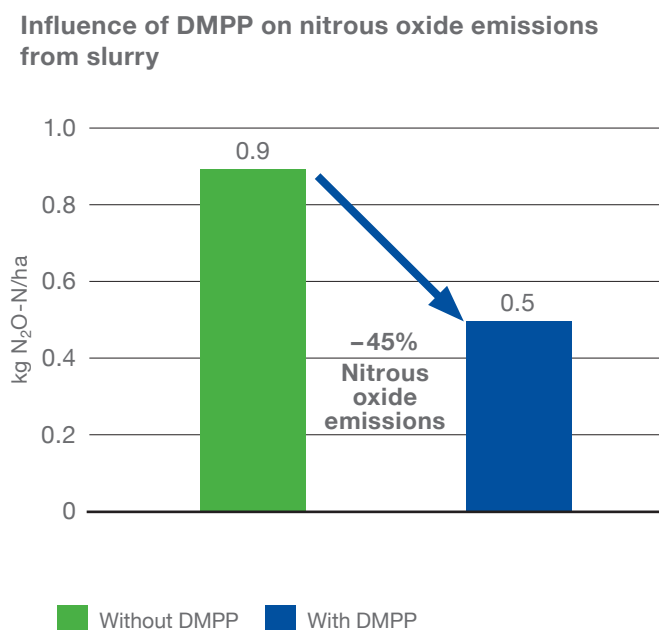
Numerous model tests and field trials have shown that nitrogen stabilisers are capable of considerably reducing the conversion from ammonium to nitrate. The result a reduced risk of nitrate leaching.



Pain, B.F. et al., 1994;  
320–340 kg Total N/ha/year in Nov.; Lysimeter testing; Devon, UK

### Vizura® reduces nitrous oxide emissions

Vizura® also reduces the amount of damaging nitrous oxide emissions that are produced. Nitrous oxide builds up in the ground as a side effect of nitrification and denitrification. The experiment shows that the use of DMPP can reduce N<sub>2</sub>O loss by 45%.



Dittert et al., 2001

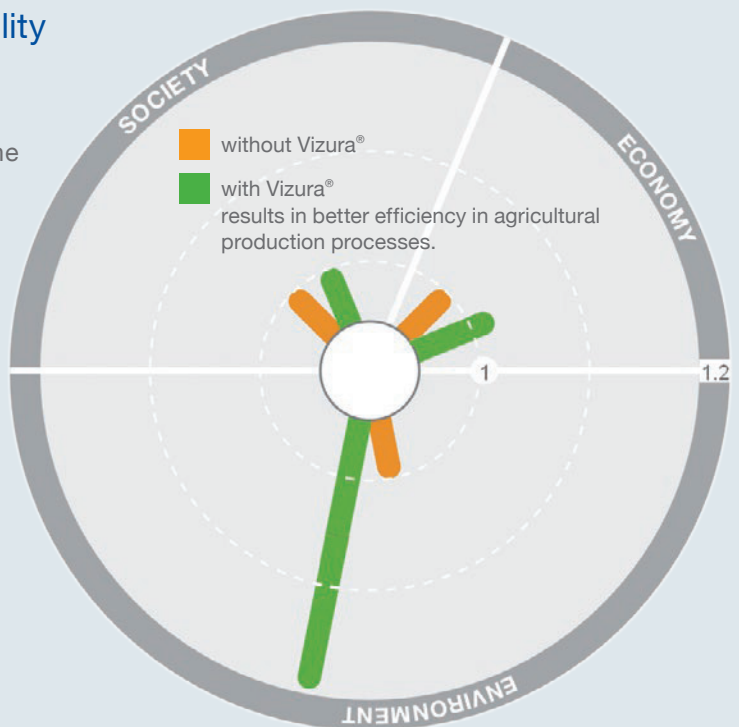


## AgBalance™ tool demonstrates sustainability

How sustainable is the use of Vizura® in silage maize production? The AgBalance™ tool provides a clear answer. This method involves testing and evaluating the sustainability in agriculture based on a life cycle analysis. The analysis takes into account ecological, economical, and social sustainability indicators. The result is a comprehensive profile of the sustainability of Vizura®.

As part of the analysis, typical silage maize production was tested in northwest Germany both with and without the addition of Vizura®. All of the production stages up to and including the maize harvest were taken into account. The analysis showed that using Vizura® to stabilise the slurry led to improved results for both the economy and the environment (length of columns in diagram at top right of this page).

For further information, please visit  
<https://agriculture.basf.com/global/en/sustainable-agriculture/agbalance.html>

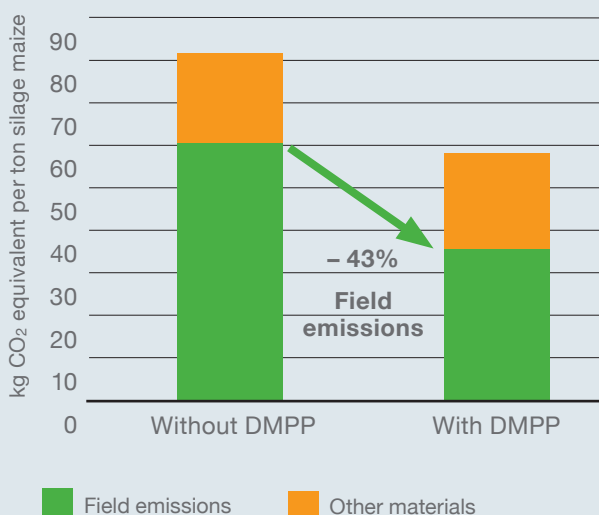


## Environmental impact

From a sustainability perspective, the biggest positive impact of Vizura is on the environment due to its reduction of the damaging greenhouse gas, nitrous oxide. The results are convincing : the use of Vizura® considerably reduces greenhouse gas emissions from slurry.

The graph of the results of the AgBalance™ study shows that Vizura® reduced emissions in the field by approximately 43%, thereby making a valuable contribution to the environment and helping to improve the sustainability of agriculture.

### Greenhouse gas emissions when using agricultural fertilisers



Field emissions Other materials

Calculations based on AgBalance™ study 2015, BASF

TM = registered trademark of BASF







## HOW AND WHEN SHOULD VIZURA® BE APPLIED?

Vizura® can be used on any crops that are fertilised with slurry or digestate. It can be used in combination with all slurry application techniques. Thanks to its formulation, Vizura® is easy to use and offers significant practical advantages.

Different dosage options allow Vizura® to be applied under different conditions.

It is important that Vizura® is evenly distributed throughout the slurry or digestate.

### Application periods

Vizura® can be used in combination with slurry or biogas digestate for all crops.

- **Maize:** Application of Vizura® before sowing
- **Cereals:** Application of Vizura® in the spring
- **Oilseed Rape:** Application of Vizura® just before sowing in the autumn or spring
- **Pasture:** Application of Vizura® at beginning of vegetation period and just after each cutting
- **Beets:** Application of Vizura® just before sowing
- **Potatoes:** Application of Vizura® before planting



**Maize**



**Cereals**



**Oilseed Rape**



**Pasture**



**Beets**



**Potatoes**



## Dose rate and application techniques

Dose rates vary between 1.0 l/ha and 3.0 l/ha. The recommended dose rate depends on the type of slurry application and the depth of slurry incorporation, but it is independent of the type of soil, type of slurry, or crop.

**Vizura®**  
**3.0 l/ha**

at a depth of slurry incorporation of over 20 cm (e.g. ploughing) and for all applications in late summer and fall.



**Vizura®**  
**2.0 l/ha**

at a depth of slurry incorporation of between 0–20 cm in spring (e.g. drag shoe, drag hose, or soil groove technique), as well as direct incorporation using a grubber or disk harrow.



Source: Wilfried Schliephake

**Vizura®**  
**1.0 l/ha**

for localised application (strip-till technique).



Source: Wilfried Schliephake

## Dosage system

In order to ensure optimal performance Vizura® needs to be mixed as thoroughly as possible with the slurry or digestate.

Vizura® can be added on the farm either into the main slurry filling line or into the suction hose. It can be mixed in manually via a bypass or using a dosage system. It is important that Vizura® is evenly distributed in the slurry.

Using a dosage system will ensure that Vizura® is mixed in correctly. The dosage system can be used on the farm or installed directly on the vehicle. The remote control makes dosing from the driver's cab easy.



Addition via suction hose



Addition via bypass



Dosage system for Vizura®: pump



Dosage system for Vizura®: remote control





For more information of Vizura®, please visit  
[agricentre.basf.co.uk/vizura](http://agricentre.basf.co.uk/vizura)

BASF PLC, 4th & 5th floors,  
2 Stockport Exchange, Railway Road,  
Stockport, SK1 3GG, United Kingdom  
T:0161 485 6222

Vizura® is a registered trademark of BASF

 **BASF**  
We create chemistry