Instinct® a new generation of nitrogen stabilizer, reducing emissions and providing an optimized supply of nitrogen for corn.

Marcin Dzikowski – Corteva Agriscience Germany
Rose Kristoffersen – Corteva Agriscience Denmark
Brooks Coetzee – Corteva Agriscience USA
Jean-Yves Merchez – Corteva Agriscience France
What it is and what are the benefits?

Instinct is a stabilizer for use with nitrogen fertilizers to optimize crop yield potential, minimize losses of nutrients and increase nitrogen use efficiency.

Instinct application combines advantages for crop (nitrogen availability), grower (higher yield) and environment (less leaching to ground water + less emission to atmosphere).
# Product profile

<table>
<thead>
<tr>
<th><strong>Active ingredient</strong></th>
<th>Nitrapyrin 300 g/L</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Formulation</strong></td>
<td>Microencapsulated suspension (CS)</td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td>Mineral and organic fertilizers</td>
</tr>
<tr>
<td><strong>Use rate</strong></td>
<td>1.7 l/ha</td>
</tr>
<tr>
<td><strong>Crops</strong></td>
<td>Corn, cereals, winter oilseed rape, potato, sugar beet*</td>
</tr>
<tr>
<td><strong>Incorporation</strong></td>
<td>Mechanical incorporation ensures Instinct activity and efficiency (alternatively, 15 mm rainfall within 10 days from application)</td>
</tr>
<tr>
<td><strong>Corrossivity</strong></td>
<td>None – water-based formulation with pH=7</td>
</tr>
</tbody>
</table>

* - other crops are coming
How it works?

Ammonium $\text{NH}_4$ (+) positive charge

Nitrosomonas bacteria

Nitrite $\text{NO}_2$ (-) soil negative charge

Nitrobacter bacteria

Nitrate $\text{NO}_3$ (-) negative charge

Nitrogen loss through leaching

Nitrogen loss through denitrification

Nitrate (-) negative charge

Soil (-) negative charge

Repels
Benefit for the crop:

- Urea with N 120 kg/ha, Untreated
- Urea with N 120 kg/ha applied preplanting Stabilized with Instinct 1.7 l/ha
Benefit for the grower:

Grain corn yield at 14% grain moisture in t/ha, average from 6 trials carried out in 2020 in Europe.

On the average 5% more yield.
Benefit for the environment

Multiple peer reviewed publications, for reference:

- **Wolt** (2004) meta-analysis – 13 studies on N\textsubscript{2}O emissions – demonstrating nitrapyrin has potential of 51.2% reduction on average

- **Qiao et.al.** (2015) meta-analysis – 62 studies on various gas emissions – demonstrating nitrapyrin has potential of 44% reduction on N\textsubscript{2}O emission on average
Benefit for the environment:

N from N\textsubscript{2}O in g/m\textsuperscript{2} emissions Oxylis trial France 2013

<table>
<thead>
<tr>
<th>Date Applied</th>
<th>Slurry</th>
<th>Slurry + Nitrapyrin</th>
<th>Slurry</th>
<th>Slurry + Nitrapyrin</th>
<th>Slurry</th>
<th>Slurry + Nitrapyrin</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 29th</td>
<td>45,4</td>
<td>19,8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 14th</td>
<td>165,5</td>
<td></td>
<td>85,8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 18th</td>
<td></td>
<td></td>
<td></td>
<td>209,5</td>
<td></td>
<td>146</td>
</tr>
</tbody>
</table>

-55% -48% -30%
Emission – ongoing efforts

- University of Turin trial started in autumn 2019 with spring & autumn applications with slurry on light and heavy soils with and without stabilization – all gas output will be measured, waiting for final data

- Trial with SEGES established in spring 2021 to measure gas output in corn with and without Instinct stabilizer
Instinct = Benefits
crops, growers and the environment

✓ Instinct works with every nitrogen fertilizer containing an ammonium form of nitrogen.
✓ Fertilizer value after using Instinct increases – more nitrogen available for the crop, reduced loss to ground water (leaching) and to the atmosphere (volatilization) – Increased Nitrogen Use Efficiency
✓ Atmosphere & Air: significant reduction of greenhouse gas emissions – N₂O by 40-50%
✓ Soil & Water: significantly better retention of nitrogen in the soil
✓ More nitrogen for the crop + less nitrogen loss to the environment = higher yield for the grower, a positive financial and environment impact