## Urea and gaseous emissions

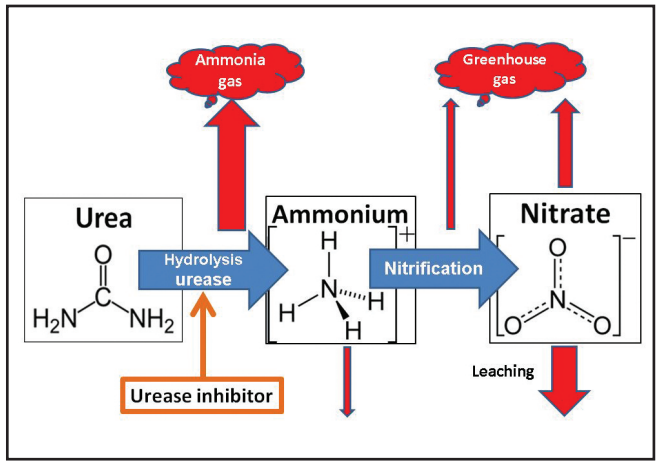
### Greenhouse gas (GHG) emissions

- Urea and stabilised urea can reduce GHG emissions compared to CAN
- The EU has committed to reduce agricultural GHG emissions by 30% by 2030

## Ammonia gas emissions

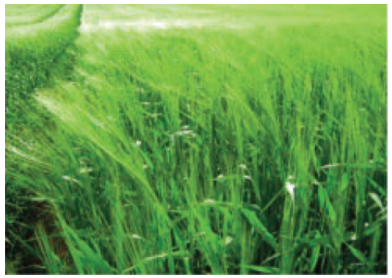
- Urea will increase ammonia emissions compared to CAN
- Urea can be stabilised with a urease inhibitor to minimise ammonia losses
- Ireland has committed to reduce ammonia emission by 5% by 2030

**Major fertiliser N transformations and N loss pathways. Urease inhibitor (NBPT) reduces N loss by slowing urea hydrolysis.**




**Relative star rating of the different N fertilisers**

| | CAN | Urea | Urea + NBPT |
|---|---|---|---|
| Cost of N | ★★★½ | ★★★★★ | ★★★★ |
| Yield | ★★★★★ | ★★★★½ | ★★★★★ |
| N recovery efficiency | ★★★★★ | ★★★½ | ★★★★★ |
| Greenhouse gas | ★★ | ★★★★★ | ★★★★★ |
| Ammonia gas | ★★★★★ | ★★ | ★★★★½ |



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Crops Environment & Land Use Programme

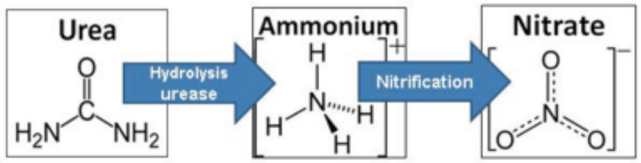
Johnstown Castle

# Urea N Fertiliser


Teagasc
Agriculture and Food Development Authority

## Urea compared to calcium ammonium nitrate (CAN)

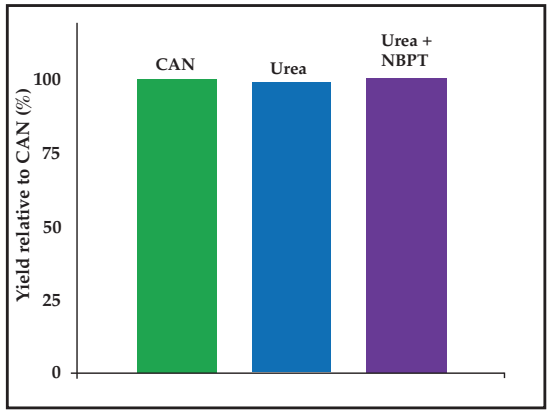
- Urea is 46% Nitrogen (N)
- CAN is c. 27% N
- Urea is converted to ammonium and nitrate in soil (see below)




- Plants take up mainly nitrate and ammonium but can take up urea too
- N loss by ammonia gas volatilisation (loss to air) occurs when urea converts to ammonium

## Yield

Teagasc trials show that CAN, Urea and Urea stabilised with the urease inhibitor NBPT frequently give similar yields but Urea has the lowest N recovery




Average of 6 grassland sites, 5 N rates and 30 fertiliser applications dates

## To minimise N (ammonia) loss from Urea

- **Rainfall:** best ammonia reductions from rain shortly after application, 7-14mm gives large reductions but be cautious of leaching and N runoff loss
- **Avoid** applying to wet soil/grass followed by windy, sunny conditions
- Urea applied into a crop **canopy** is more protected from wind and direct sun
- The proportion of N loss as ammonia tends to increase with increasing N rate e.g. grazing N rates (typically <40 kg N/ha) are potentially less risky than silage N rates (typically >80 kg/ha)
- Urea can be riskier on soils with pH >7.1

- Apply Urea before **lime** application (10 days)
- Wait at least 3 months after **liming** before applying Urea
- Wait 10 days after **slurry** application before applying Urea and *vice versa*
- **Incorporating** into soil will minimise ammonia losses but risk of toxicity to seedlings increases with rate, do not place urea with seed for this reason
- Use a **urease inhibitor** (e.g. NBPT reduced ammonia N loss in Teagasc trials by c. 79% on average)

## Urea fertiliser spreading considerations

- Urea is less dense than CAN making it more difficult to spread evenly at wide bout widths
- Small prilled urea (50%<2mm) is particularly difficult to spread on bouts >10m. Larger particle sizes (80% 2-4mm) are available and suit wider bout widths

- Important to know size distribution, determine with hand-held sieve box
- Ensure the fertiliser spreader is set up correctly by consulting the spreader manufacturers recommendations for the specific product being spread

- Use trays to check the spread pattern
- Urea will have a narrower maximum bout width and a more wind prone spread pattern than CAN
- Urea has transport and work rate advantages over CAN because it has higher N content