



# Stabilized Urea for Enhanced Nitrogen Use Efficiency

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## Introduction

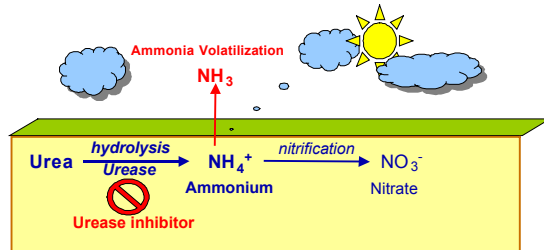
### The challenge with urea

Ammonia losses to the atmosphere (volatilisation) from broadcast urea make up about 21% of nitrogen applied on global average (Bouwman et al. 2002) and is estimated under temperate conditions at 15% (ECETOC, 1994).

#### Volatilisation

- > diminishes nitrogen use efficiency
- > contributes to soil acidification, eutrophication and trans-boundary pollution
- > can be reduced by stabilizing urea through an urease inhibitor

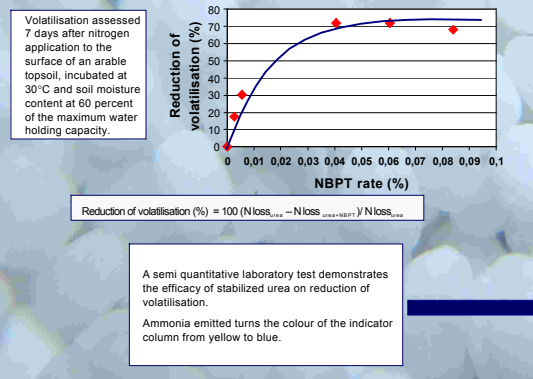
Reduction of volatilisation from urea will contribute to achieve the goals of the Gothenburg Protocol to abate Acidification, Eutrophication and Ground-level Ozone. "A Party shall take such steps as are feasible to limit ammonia emissions from the use of solid fertilisers based on urea."



## Stabilized Urea

### Product

- > Urea stabilized by the urease inhibitor N-(n-butyl) thiophosphoric triamide (NBPT)
- > NBPT concentration from 0.04 to 0.1 %
- > Nitrogen content 46%
- > As shown in the figure, maximum reduction of volatilisation is already achieved at about 0.04% NBPT

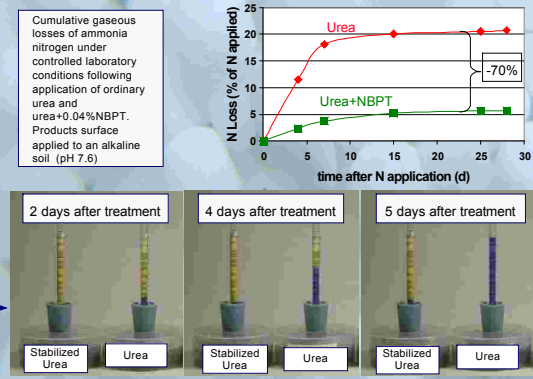


## Efficacy of stabilized urea

### Volatilization reduced by 70%

NBPT amendment to urea reduces the rate of urea hydrolysis and hence prevents localized zones of high soil pH and high ammonium concentrations, both conducive to volatilisation.

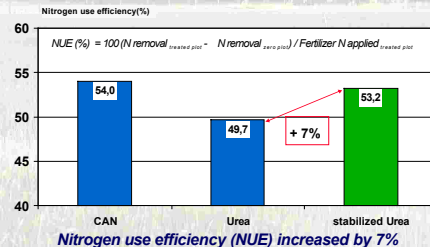
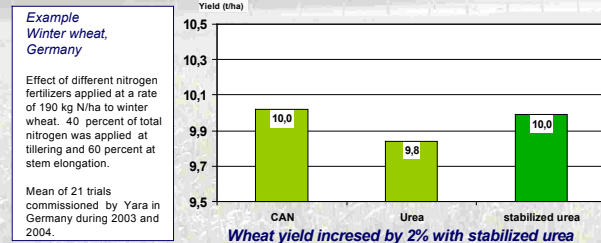
As shown in the figure, volatilization from urea+NBPT is reduced by about 70% compared with ordinary urea.



## Enhanced nitrogen use efficiency of stabilized urea

### Proved in field trials

Results from 50 field trials conducted from 2002 to 2004 in France, Germany, UK, Italy and Spain on different arable crops confirm the enhanced nitrogen use efficiency (NUE) of NBPT amended urea compared to ordinary urea.



## Conclusion

Volatilisation from stabilized urea is reduced by about 70% compared with ordinary urea. Assuming 15% N loss from ordinary urea those savings enhance nitrogen availability to crops from stabilized urea by about 10% per unit nitrogen applied. For instance, at a nitrogen rate of 190 kg N/ha applied to winter wheat, nitrogen availability from stabilized urea is about 19 kg N/ha higher. In field trials, the additional nitrogen supply materializes in a 2% yield increase. Together with an increased protein content this contributes to an extra nitrogen removal of about 7 kg N/ha and because of this to an enhanced nitrogen use efficiency of 7% compared with ordinary urea.

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