Fertilisers Efficiency Enhancers

CALL FOR EVIDENCE

13 March 2024

Fertilisers Efficiency Enhancers recommends adding the use of Urease Inhibitors (UI) to Annex III of the revised NEC Directive

Fertilisers Efficiency Enhancers, a sector group of Cefic, represents the value chain of nitrogen stabilisers and other efficiency enhancers in Europe and promotes the agronomic and environmental benefits of nutrient enhancers in fertiliser applications. As a sector group of Cefic, we support the objective of the National Emission Reduction Commitments (NEC) Directive (Ares(2024)1164801) and welcome the opportunity to provide input to the Call for Evidence on the evaluation.

Based on the data provided below, we recommend adding the use of Urease Inhibitors (UI) to Annex III 'CONTENT OF NATIONAL AIR POLLUTION CONTROL PROGRAMMES REFERRED TO IN ARTICLES 6 AND 10', to be more precise, a national advisory code of good agricultural practice (Part 2), upon the revision of the Directive. This would, to a greater extent, contribute to achievement of the objectives of the NEC Directive in decreasing the CO_2 footprint of agricultural production systems.

Urease Inhibitors (UI) can reduce emissions of ammonia (NH3) and nitrous oxide (N_2O)

Background

Readily available, urea is an attractive fertiliser for farmers due to its high nitrogen (N) content, low cost and good water solubility. Nevertheless, NH3 volatilisation potential after field application represents a challenge to the use of urea as well as other urea-containing fertilisers (e.g. UAN, Urea Ammonium Nitrate solution). The following is the scientific literature supporting this argument:

- **Pan, *et al*. (2016)** https://doi.org/10.1016/j.agee.2016.08.019

According to the above Pan *et al.*, nitrogen (N) losses from urea in form of NH3 can reach up to 30 kg/ha in Europe (Table 1), which can have negative effects on crop yield and/or its quality. Furthermore, NH3 can be transported over long distances, causing eutrophication and acidification in non-agricultural areas, e.g. forests and non-fertilised grassland (e.g. in mountain areas). In addition, NH3 spreading to such non-agricultural areas can have negative effects on the biodiversity.

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This can significantly be mitigated by treating urea-containing fertilisers with UI[1].

Reduction of NH3 emissions

Current research shows that UI can reduce NH3 significantly. For the latest data and findings on reduction of NH3 emission enabled by the use of UI, we would like to draw your attention to:

- **Chen, *et al.* (2023)** https://doi.org/10.1088/1748-9326/acb833
- **Xu, *et al.* (2024)** https://doi.org/10.1038/s41586-024-07020-z

Chen, *et al.* provides a systematic and global synthesis of the current evidence on the effect of Enhanced Efficiency Fertilisers (EEF), including UI, and shows that the use of UI decreases NH3 emissions compared to untreated fertilisers by more than 50% (range: ca. minus 48 to ca. minus 64%). Similar reduction factors are confirmed by Xu *et al*. listed above.

N (in the form of ammonium) from NH3 emissions which enters in soils by rainfall is subjected to the soil processes of nitrification and denitrification. In both processes N_2O emissions occur. Therefore, the significant reduction of NH3 emissions also results in a significant reduction of indirect N_2O emissions (therewith CO_2 equivalents). Consequently, UI reduce the CO_2 footprint of agricultural production systems.

Additional benefits of UIs for reduction of N_2O emissions

For this aspect, we would like to draw your attention to:

- **Grados, *et al*. (2022)** https://doi.org/10.1088/1748-9326/ac9b50
- **Chen, *et al.* (2023)** – mentioned above

Grados, et al. performed a systematic review and a second-order meta-analysis to assess the abatement efficiency of N_2O mitigation practices from agricultural soils. The data demonstrates that several technology-driven solutions, such as UI, showed significant l N_2O mitigation potentials (minus ca. 23%, similar value in the above Chen et al. 2023) across meta-analyses.

In conclusion

Inclusion of UI technology into Annex III of the NEC Directive, as well as the promotion of their use via other legislative acts, would enable the European Union to further decrease emissions of

[1] IFA data – average 2015-18 EU 27+UK and EMEP/EEA air pollution emission inventory guidebook 2019

NH3 and N_2O (and so the CO_2 footprint of agricultural production systems) and their detrimental impact on the environment by securing high crop yield and quality levels.