

Protected urea offers sustainable alternative to AN

Increasing scrutiny on ammonia emissions from agriculture, the high price of nitrogen fertiliser and limited availability of ammonium nitrate has thrust protected urea into the spotlight as a viable environmental and financial alternative for crop nitrogen requirements.

Intro

Straight urea is seen as the cheaper alternative to ammonium nitrate (AN), however, with potentially high losses from ammonia volatilisation, it is often regarded as a less efficient way to apply nitrogen (N).

A fertiliser market at the mercy of global pressures has contributed to product supply issues, which will have caused growers concern over securing fertiliser stocks for next season. Many will be assessing every option, so fully understanding the benefits that protected urea could offer as a more financially and environmentally sustainable solution, will help those using it achieve more from less.

Protected urea differs from straight urea as it is coated with an inhibitor, which blocks the urease enzyme in the soil from interacting with the urea on application, reducing the risk of volatilisation, as Tom Oates, nutrition agronomist at Origin Fertilisers, explains.

“Compared to standard urea, the urease inhibitor on protected urea reduces ammonia losses to the atmosphere after application by an independently proven 70%. Protected urea can allow farmers and growers to apply a urea-based fertiliser throughout the season without the concern of losing valuable nitrogen through volatilisation losses.”

Comparing protected urea to ammonium nitrate

Growers after an alternative to AN should consider the economic benefits that switching to a protected urea can have. Multiple trials in the UK over the past twenty years have shown that protected urea consistently gives the same crop yields as AN.

Protected urea is significantly lower cost per kg of nitrogen compared to AN, and in a nutshell, protected urea can be considered as a direct alternative to AN in terms of agronomic performance, with the benefit of considerable cost savings on nitrogen inputs.

The cost difference between urea and protected urea hasn't changed despite the current fertiliser price increases. This means the cost of the urease inhibitor is now much lower as a proportion of the overall cost of protected urea products.

At 46% nitrogen, protected urea also has practical and logistical advantages over 34.5% N as less product is required to be transported, handled, and stored. Unlike AN, protected urea is non-hazardous and not subject to the same health and safety restrictions around transport and storage.

What is a urease inhibitor?

When urea is applied to the soil it is rapidly converted into ammonia. This process, known as hydrolysis, is activated by urease enzymes which are produced by plants, fungi and microbes. If hydrolysis happens on or near the soil surface, the ammonia can be lost to the atmosphere through volatilisation. Defra's NT26 project showed an average ammonia loss from unprotected urea of 24%. In addition to the significant financial cost to growers,

ammonia is a significant air pollutant that causes respiratory health problems to humans and environmental damage to fragile ecosystems.

However, a urease inhibitor slows down hydrolysis giving time for the ammonia to be converted into ammonium, which is adsorbed onto clay particles in the soil and available for plant uptake. Slowing down hydrolysis by inhibiting urease activity leads to a significant reduction in ammonia volatilisation.

There are several urease inhibitors on the market with a range of active ingredients, and NBPT is widely regarded as the most effective.

“NBPT is the inhibitor used in Origin Fertilisers Sustain protected urea and has been proven through thousands of field trials in a variety of crops to hold nitrogen in the ammonium form for longer. It creates an imitation of the urease enzyme to slow down hydrolysis allowing the urea to convert into ammonium and reduce volatilisation losses,” comments Mr Oates.

As well as reducing ammonia emissions, trial data on protected urea has highlighted its ability to reduce nitrous oxide losses by 73% compared to AN. This data is from independent trials in the UK and Ireland on cereals, oilseed rape, sugar beet and grassland, where it gave performance that was the same or better than nitrates.

Solving a problem like urea

Urea is a major culprit of agriculture’s high ammonia emissions, but protected urea has offered an option for UK growers to use the product whilst reducing its environmental impact.

“As an industry we must be working towards lowering our emissions, and there is no doubt that fertiliser has a big part to play. Innovative technology that can allow the plant to access more nitrogen over a wider spreading window is good news and should be widely considered by the industry. By switching to protected urea now, growers will be future proofing themselves for when changes to granular urea application are likely to come into force in 2024,” adds Mr Oates.

As farming looks to achieve its targets of reducing greenhouse gas and ammonia emissions from fertiliser, protected urea has huge potential to help the industry do this, while maintaining current crop production levels.

Facts about protected urea

- Reduces ammonia emissions
- Reduces nitrous oxide, a greenhouse gas, emissions
- Achieves similar yields to AN
- Easier to store than AN
- Allows spreading in drier conditions than urea