Innovation Insight

Good inhibitions

Regulations are now in place which restrict the use of urea fertilisers and it's anticipated this will lead to a surge in uptake of urease inhibitors. *CPM* looks at the latest on a product which promises to deliver the goods for both the environment and farm businesses.

By Janine Adamson

The new urea fertiliser regulations — they could be viewed as both an opportunity and a threat. Although uptake of inhibitors has been slower than expected so far, Omex Agriculture's David Booty believes this could be a chance to demonstrate positive industry action.

"If growers don't abide by the rules, the regulations will tighten further and it's likely Defra will legislate. However, this is an opportunity for a clean slate by showing a proactive response to a problem. It could be a real success story for British agriculture," he says.

Farm assurance standard

Monitored as a new Red Tractor farm assurance standard, the regulations apply to any fertiliser that contains more than 1% of urea nitrogen, with two timeframes in place — untreated solid urea/liquid UAN fertiliser can be applied between 15 January to 31 March each year, whereas outside of this, a urease inhibitor must be used.

And the reason why? Urease inhibitors work by blocking the urease enzyme found in nature from hydrolysing urea and leading to ammonia losses in some situations. It's believed doing this will help to meet the government target of reducing ammonia emissions by 70%.

In terms of the three recognised urease inhibitors, David says NBPT (N-(n-butyl) thiophosphoric triamide) is the only one that can reliably deliver the 70% reduction targets the government is seeking. "It's the most obvious active ingredient to use, so now it's a case of getting everyone on board with using urease inhibitors," he comments.

Although NBPT has been available as an active for around two decades, having originated in the USA, interest in the UK ▸

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▸ primarily came about in response to the government targets.

NitroShield benefits

This resulted in NitroShield — an NBPT-based urease inhibitor for use with liquid nitrogen applications. David says one of its selling points is the fact it's supplied as a separate product. "Inhibitors become most relevant in high risk scenarios so really, they want to be used when it's truly necessary.

"It's back to the old adage of applying the right product at the right time; all with a view to avoiding waste," he says.

This is a mantra which no doubt strikes a chord with Velcourt's technical director, Nick Anderson. He says the Red Tractor farm assurance standard should be the bare minimum because the risk of volatilisation doesn't start on a given calendar date.

"Where there's risk, we advise using inhibited urea not because of regulation, but because it's the right thing to do," he says.

Nick explains that Velcourt has been taking a close look at NUE measurements for the past two years and the reasons behind poor nitrogen recovery. "If it's not recovered it's wasted, harming the environment and having an impact on farm business ROI. That's why it's important to identify sources of inefficiency, which are most likely to be biological lock up, leaching during winter, or in this case, volatilisation from urea fertiliser."

The company has been undertaking trials to evaluate urease inhibitors which according to Nick, clearly demonstrate that the technology increases the amount of nitrogen recovered.

Looking specifically at NitroShield, field trials on winter wheat are comparing a range of nitrogen (Nitroflo 30) rates from 0 to 240kgN/ha applied mid-March and

On-farm POV

From a farmer's perspective, obligatory use of urease inhibitors could be viewed as further unnecessary input cost, adding more pressure to profit margins. But, claims that they can deliver the 70% reduction in ammonia emissions target while increasing yields and grain proteins by 0.3t/ha and 0.2% respectively, means they are starting to pique interest.

That's been the case for Lincolnshire grower Mark Stubbs who set up his own independent field trials across more than 400ha to compare 50% untreated crop with 50% treated with NitroShield. He's keen to stress that although Omex isn't sponsoring the trials, results will be shared to compare notes.

"We've considered other options for reducing nitrogen emissions including molasses formulations, but these don't have Defra approval, and amino acids, but we haven't seen any evidence to support their use."

Mark admits that if it weren't for the new regulations, he probably wouldn't have considered using urease inhibitors. Regardless, his trials aren't over a small area and as a result, his expectations are high.

"We know that we have to see an improvement in nitrogen-plant efficiency, which can be partly achieved through reducing volatilisation. The regulation has made me think of our options two years ahead of the deadline," he says.

Mark looks after Beaconsfield Farm — a 110ha arable enterprise based near Marshchapel that's used Omex liquid fertiliser for the past four years, having switched from a granular fertiliser regime. The main holding is Manor Farm in Calcethorpe which operates over a further 590ha. The combined acreage includes 280ha of cereal crops, 280ha of oilseed rape, 100ha of spring barley and around 40ha of rye.

Due to the rising cost of fertiliser and pressure on yields, Mark says his focus has increasingly been on the role of nitrogen in the crop growing cycle having found that too much nitrogen can have a negative impact on yield.

"Nitrogen will help a crop to reach a threshold, but where on occasion we apply more than is necessary, yields have reduced by about 5%. We're trying to find the sweet spot," he says.

In terms of fertiliser approach, Mark starts in late February with the first of three liquid applications in equal splits of Omex 22N+10S03 (Nitroflo 22+S) at a rate of 250 l/ha. This replaces an early granular fertiliser 21N:60S03 application in February. The second and third liquid applications are applied at the end of March and April respectively, providing 69kgN/ha and 31kgSO3/ha at each application. The spray timings coincide with pesticide applications at GS30, 31 and 32.

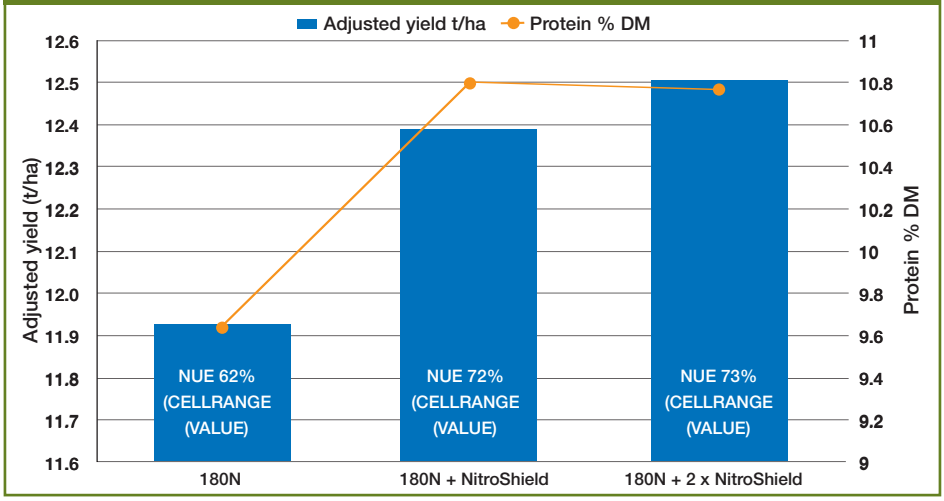
"Applying the granular sulphur fertiliser in one hit meant a risk of losing much of the sulphur to leaching," explains Mark. "But, when applying sulphur along with the liquid nitrogen in smaller doses and more frequently, both elements are taken up more efficiently by the plant. We're applying half of the sulphur that we used to and getting higher yields."

Mark Stubbs has instigated independent field trials across more than 400ha to compare 50% untreated crop with 50% treated with NitroShield.

Mark has already decided to include NitroShield on his winter wheat and OSR and possibly spring barley, due to it optimising nitrogen use efficiency and demonstrating a 10:1 return in independent trials.

He says he anticipates a successful outcome from his own trials this year, with the goal of yield and grain protein increases. Mark also says there should be a positive impact on the environment and an ability to extend his nitrogen application window, which offers greater flexibility to his fertiliser regime.

Adjusted yield and grain protein at optimum nitrogen rate



Source: Omex Agriculture

According to Tom Watkins, dry, warm and windy are most conducive to volatilisation and therefore day-by-day assessments should be made.

mid-April, with and without NitroShield.

Nick says so far, the trial results look promising in terms of Nitrogen Fertiliser Use Efficiency (NfUE). But recognising the importance of replicated data across years, OMEX and Velcourt have committed to another season of trials focusing on the continual development of inhibitor use in real-life farm practice. Nick says this is to ensure growers are equipped with the most accurate scientific data to achieve the best outcome for their farm.

But what's understood so far about volatilisation and urease inhibitors from a practical perspective? In terms of conditions, Velcourt agronomist Tom Watkins says dry, warm and windy are most conducive to volatilisation and therefore day-by-day assessments should be made before taking action. "As climatic conditions become increasingly unpredictable, the UK can certainly experience those conditions before the stipulated date of 1 April."

He agrees that a benefit of NitroShield is its flexibility. "As with all inputs, they should only be used when truly required to minimise wastage. Being a separate product makes this easy to achieve. Equally for the operator, it's simply added to the induction hopper and it's business as usual."

Tom believes the facts make sense and using urease inhibitors addresses a lot of key objectives. "It's a conscious product — it improves NUE while making a positive contribution to the environment."

Omex has also conducted three years of trials on NitroShield. These demonstrate that the product meets the government target of reducing ammonia emissions by 70% when mixed with Nitroflo or Nitroflo S grades prior to application.

The trial work was conducted in UK conditions, which David says is critical. "Trials have taken place both in the lab and in-field, so we're confident that the product will deliver consistent results for UK growers.

"Application-wise, rates can be reduced when soils are neutral or slightly acidic, or the crop canopy provides full coverage of the soil, the ambient temperature isn't expected to be more than 15°C within 24 hours of application, or a FACTS-qualified advisor has recommended," he explains.

Full rate use

"Full rates should be used when soils are alkaline (pH>7.0) or when the crop canopy doesn't provide full coverage of the soil, or the ambient temperature is expected to exceed 15°C within 24 hours of application."

On the topic of soils, David stresses that NitroShield doesn't have a long-term effect on soil biology, despite the reservations of some growers. "The role of inhibitors has been a topic of discussion especially within the regenerative agriculture community.

"It's important to outline that inhibitors have been robustly tested and evaluated by independent institutes such as Rothamsted Research and Teagasc to assess microbial activity. Unsurprisingly, there isn't a long-term effect. Avoiding volatilisation on the soil surface incurs a delay for just a few days, so without lasting potency, there can't be a lasting impact on soil health," he concludes.

Untreated liquid UAN fertiliser can be applied after 1 April if agronomic justification is provided by a FACTS-qualified advisor to demonstrate ammonia losses will be at or below the level of including a urease inhibitor. ■

Innovation Insight

Specialising in complex liquid formulations for use in industries ranging from agriculture to energy, Omex develops, manufactures and supplies liquid fertilisers and crop nutrition solutions.

NitroShield is Omex's innovative urease inhibitor which aims to reduce ammonia emissions to help growers to farm more sustainably, and can be utilised within all liquid fertilisers including their own Nitroflo N+S and Multiflo NPKS liquid fertiliser range.

The product has undergone three years of rigorous testing to establish the most efficient and effective form of urease inhibitor available to farmers.

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