GrowHow View Update

Cereals Special June 2010

Choose the best N source

by Allison Grundy

An ammonium nitrate product, such as Nitram, is a much more reliable source of Nitrogen than urea and that's not just my view, it's also the opinion of a consortium of independent research organisations.

The consortium, led by ADAS, worked on the biggest study ever undertaken into alternative sources of Nitrogen for UK crops. The £4.8 million project ran from 2002 to 2005 and was funded by Government. For the first time sophisticated wind tunnel technology was used to accurately measure ammonia losses from the different fertilisers applied.

Myths uncovered

The widely held belief that, if urea is applied early, when the soil is moist and temperatures relatively cool, the risk of ammonia loss through volatilisation will be small, was found to be completely untrue. From the early season urea applications in winter cereals the ammonia emissions ranged from 10% to a hefty 43%. In comparison the losses from Ammonium Nitrate were only between 0% and 10%.

The supposed benefit of going early with urea was not the only myth this research disproved. Accepted wisdom is that ammonia losses are only significant on calcareous soils but over the whole research project the two biggest losses from urea were recorded at ADAS Gleadthorpe (35%) and Rothamsted (43%) and these are hardly calcareous soils.

The research also discovered that the average loss of Nitrogen as ammonia from urea was, at 22%, almost twice as high as previously thought.

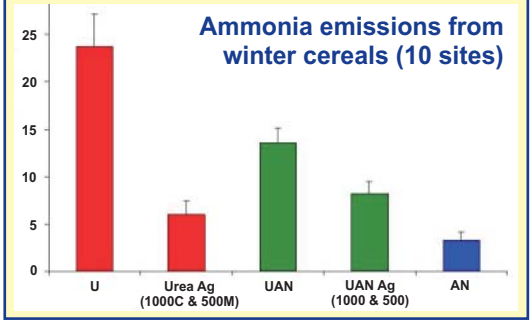
So can these losses be managed by increasing application rates to compensate? There are two difficulties with this:

1. Working out when to increase the rate and by how much is a significant challenge. The average loss might have been 22% but the range was huge – anything from just 2% right up to 43%.
2. At a time when farmers are being asked to *'produce more and impact less'*, it is difficult to justify the use of an input which might release almost half of its ammonia to the atmosphere where it will contribute to acid rain and the enrichment of sensitive habitats such as heathlands.

In financial terms choosing urea rather than Nitram could result in a loss of as much as £115/ha. On the other hand it might, if all goes well, perform as effectively as the Nitram. The problem is that predicting when the conditions will be ideal for urea is an impossible task.

Urease inhibitors

There are a number of products which slowdown the breakdown process by which urea releases ammonia. The research included one of these, Agrotain. The scientists concluded that, whilst these products do help, even with an inhibitor, the average loss of ammonia was still higher than the losses associated with Ammonium Nitrate.

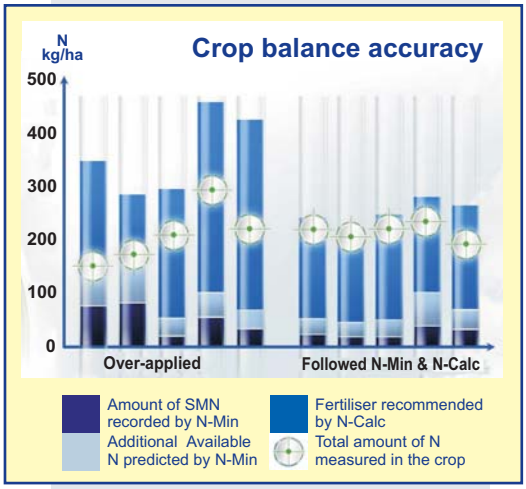


N-Min® & N-Calc for accurate rates

Whilst Nitrogen is essential for both yield and quality, over application wastes nutrient and money, reduces yield and leaves unused N in the soil, which increases the risk of leaching.

GrowHow's unique N-Min & N-Calc service takes the guesswork out of fertiliser calculations. N-Min is the only Nitrogen test that measures both Soil Mineral Nitrogen and the Additionally Available Nitrogen to quantify the Total Nitrogen that will be available to the crop from the soil during the growing season.

N-Calc produces the fertiliser recommendation using the latest research on crop N requirements together with the N-Min figures and other data such as soil type, yield and quality expectations and the amount of Nitrogen already taken up by the crop.



The graph shows data from ten fields on ten different farms. The target symbols indicate the amount of N measured in the crop. The data on the left is from farms that did not follow N-Min & N-Calc and applied their usual rates. On the right are farms where N-Min & N-Calc was followed. The farmers on the right have optimised their fertiliser use and minimised the environmental impact.

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Sulphur is essential

Unless you are confident that you have adequate Sulphur levels, a Sulphur-containing fertiliser should now be applied as a matter of routine. That's the advice from GrowHow's Arable Agronomist, Allison Grundy.

There are two reasons for this. Firstly, the huge decline in the amount of atmospheric Sulphur so that, today, the mean deposition across the UK is only around 5-10kg SO_3/ha. Secondly, because in both cereals and oilseed rape, Sulphur deficiency will result in poor crop growth, damaging both yield and quality.

In round terms the losses associated with a lack of Sulphur range from £22/ha to £104/ha. These are significant sums so it has got to be worth putting the effort in to make sure crops get enough Sulphur.

GrowHow flexible Sulphur options

Crop	Product	Product rate (kg/ha)	Timing
Winter cereals	DoubleTop® Sulphur Gold SingleTop®*	175 250 400	Mid-Mar Mid-Mar Split mid-Mar & early Apr
Winter OSR	Sulphur Gold DoubleTop®	250 250-325	Split mid/late Feb & mid-Mar Mid/late Feb or mid-Mar
Spring cereals	DoubleTop® Sulphur Gold	175 250	Mid-Mar Mid-Mar

* top up Nitrogen with Nitram® as required

Research findings

Technically there is overwhelming evidence of the benefits of Sulphur:

- Among combinable crops OSR has the largest requirement for Sulphur. Independent research early in the last decade showed that up to 80% of yield can be at risk on light soils. Sulphur is also known to play a vital role in oil synthesis.
- There is also plenty of evidence that adding Sulphur will allow spring barley to use the additional N applied. For example, even at rates of 150kg/ha of N, grain N levels were kept below the maltsters' 1.8% threshold. In contrast, where no S was used, grain N levels got very close to the 1.8% threshold at rates as low as 100kg/ha.
- Rothamsted Research showed how important S is in achieving bread-making quality in wheat. In fact the relationship between loaf volume and the concentration of Sulphur in the grain is much stronger that the relationship between loaf volume and grain Nitrogen levels. This link is so strong you could argue that milling premiums should be paid on grain S content rather than grain protein levels.
- Because Sulphur improves N uptake it also reduces the risk of N leaching and losses to the environment and that's something which shouldn't be forgotten as farmers try to produce more and impact less.

Some common questions:

1. Can organic manures satisfy crop requirements for Sulphur?

   No this is very unlikely as only 5-10% of the S in manures will be available to the crop.

2. Does it matter what form of Sulphur is applied or when it is put on?

   Yes, the type of S applied makes a big difference. The best form is an Ammonium Sulphate fertiliser. Timing is key too. The best time to apply is in the spring when crops are growing. This is because, just like Nitrogen, Sulphur left in the soil over winter is likely to be leached away.

Sulphur deficiency widespread in Yorkshire

Symptoms of Sulphur deficiency are showing up in many fields in Yorkshire, reports Masstock Agronomist Simon Pilling. “It started to become obvious first in early drilled winter barley and as the dry weather has continued we’re increasingly seeing signs in winter wheat,” he says.

“The majority of farmers in my area apply Sulphur prophylactically to rape but they are more sceptical about the need for Sulphur in cereals, especially on heavier soil types. Given what we are seeing this year however I will be advising the use of Sulphur on many more crops next season to reduce the risk of yield loss,” he adds.

“There are quite a lot of spring cereal crops grown in this area and whilst these are not showing any visible symptoms it is important to remember that sub-clinical levels of deficiency are still capable of reducing yield,” he advises.

“We are currently tissue sampling spring crops to look for evidence of Sulphur shortage,” he concludes.

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