DAPSZC

Do your crops have enough nitrogen?

An important question facing many grain growers in the next few weeks will be, "do my crops have enough nitrogen?" Moora based Summit Area Manager, Brett Beard reasons, what you may really be asking is - would they return an economic benefit from more applied N? He says in thinking this through, growers need to review:

- The original plan with respect to yield and protein, and,
- has the season developed in a way that would make you think you may need to apply more (or less) N than the original plan.

In other words, has the yield potential changed, or, have other factors come into play such as nitrogen losses through leaching or volatilisation.

Yield potential & crop N requirements

The yield potential of your crops and the nitrogen budget would have been formulated at soil testing time in the summer/autumn. This will need to be reviewed as the season progresses.

How well the available soil nitrogen is converted into grain will be determined by a number of factors.

An important point to remember is that as long as nothing else is limiting, higher N environments generally lead to higher water use

Brett Beard

efficiency (WUE) and yield.

Late sowing can be yield limiting. With the late May break a lot of crops were sown into June. Allow about 25 kg/ha/day yield loss for cereal crops sown after June 10th on average.

In reviewing crop N requirements, you will also need to take into account other yield limiting issues that may develop, such as:

- disease;
- waterlogging;
- pests such as weeds/insects: and,
- soil moisture profile.

In cereals, about 30 kg N is required to grow each tonne of grain. About 20kg N moves to the grain and is removed at harvest and about 10kg remains behind in the straw.

No fertilizer application will be 100% efficient, all incur some losses. Typically 35-40kg N is needed to grow each tonne of cereal grain and maintain soil fertility.

When budgeting N for canola, about 55 kg is needed to produce a tonne of grain with about 40kg ending up in the grain while 15kg will remain in the stubble. Also allow for potential N inefficiencies and canola sulphur requirements.

NUE and losses

Initial trials have shown nitrogen use efficiency (NUE) is 5-8% higher if N is banded at seeding as opposed to spread on top. But there is still a lot of work that needs to be done to quantify this value.

Under certain conditions of soil pH, temperature and moisture, urea can rapidly convert to ammonia gas and be lost to the atmosphere. Volatilisation of ammonia gas increases when pH increases (i.e. when soils are more alkaline).

Some nitrogen based fertilizers cause localised alkalinity to the soil directly around the granule. Urea is the worst offender and can therefore be volatile, even on acid soils under moist conditions.

Generally, a greater risk to NUE is leaching of N beyond the root zone. The risk of leaching will largely depend on soil type with virtually nil water percolation in heavy soils and potentially heavy losses in light soils with high rainfall e.g. west Midlands.

In terms of leachability of different N forms, the positively charged ammonium (NH_4^+) form of nitrogen is held onto negatively charged soil particles, while the negatively charged nitrate (NO_3^-) form, can be leached if water percolates below the

Urea
- High leachability

Ammonification, relatively quick, 2 - 3 day conversion

Ammonium (NH_4^+)
Ideal starter N in products like
DAPSZC, MAPSZC, Vigour
- very low leachability
- low volatility

Nitrification, on average 2 - 3 week conversion (can be 5 - 6 weeks on acid sandplain soils)

Ammonia (NH_3 [gas])
- high volatility

Under certain soil conditions e.g. high pH

Nitrate (NO_3^-)
- high leachability
- low volatility

active root zone of the crop.

Urea's mobility is similar to nitrate. Urea is very mobile in the soil and can be readily leached with water movement, especially on lighter soils.

Early N

Early applications of nitrogen to cereals aim to maximise tiller and spikelet numbers. As a general rule, for each 1 t/ha of crop yield you will need to grow about 100 heads/m^2. The maximum number of tillers and grains per head are already set by the time the plant is about six weeks old.

For canola, yield potential is set during elongation and budding, hence N availability is required before elongation.

To assess the best N timing you will need to take conversion time into account. Organic and inorganic N need to be converted into NH_4^+; or, NO_3^-, before it can be taken up by plant roots.

Ammonification, the conversion of urea to NH_4^+, is relatively quick and only takes 2-3 days in moist soil. Nitrification can take 2-3 weeks or even up to 5-6 weeks on acid sands with low organic matter.

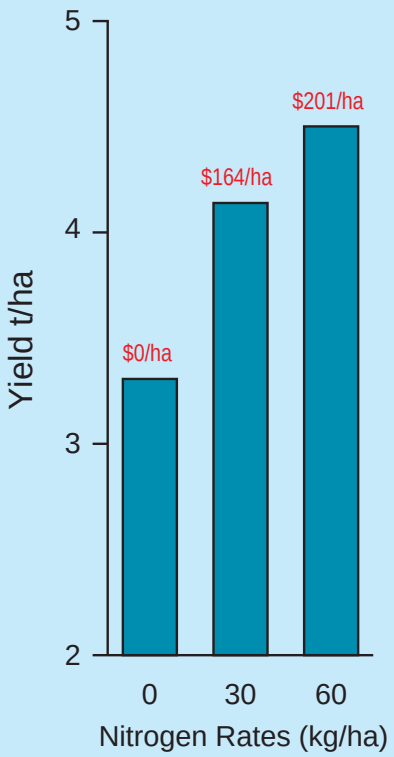
Because N for yield is required relatively early and given it may take some weeks for urea to become totally available, the best time to apply a top-up of urea is mid-tillering for cereals or about two weeks before stem elongation in canola. However, do not wait for that timing if your crop is N deficient or you have not put enough N up front.

Later N

Later N applications in cereals are aimed at maximising tiller and spikelet survival or increasing grain weight and protein content. To increase the protein content of a 1t/ha cereal crop by about by 1% you generally need about 6 kg N/ha.

High N availability later in the season in canola increases protein (good for stock feed – meal) but decreases oil (biofuel etc).

Summit Fertilizers
Liebe Group trial 2008



LSD (P=.05), 390 kg
CV, 5.42

Nitrogen return on investment
i.e. Value of extra yield (wheat @ $250/t),
Subtract cost of nitrogen

Will there be an economic response to nitrogen? Generally, the answer is yes, but there are a lot of factors to take into account in determining how much!

The Summit trial featured above had a growing season rainfall of 234mm. The crop grew and yielded well and responded significantly to nitrogen.

DAPSZC and SOP were used as the basal fertilizers. Urea was the source of N and was top dressed and incorporated by seeding.

There were also 90kg/ha N and 120kg/ha N treatments, however these were not significantly different to the 60N treatment.

There was no significant difference between protein and screenings for any of the treatments.

Urea or UAN?

When comparing the benefits of urea to liquid UAN, there is a lot to consider.

Urea is still the cheapest form of N. At today's values, 1 kg of N in urea would cost about $1.20, whilst the same kg of N in UAN form would cost about $1.55.

Expect only 5-15% uptake of nitrogen from a foliar application of UAN, so it still needs rain to wash it into the soil for root uptake. UAN is however less volatile with only half the urea content with the remainder immediately plant available.

UAN scorch risk increases with neat rates over 50 L/ha and when mixing with pesticides. Pesticide application with UAN however is a potential way to reduce application costs. Streaming nozzles lower the risk of leaf scorch but also reduce the chance of foliar uptake, and take away the chance of mixing with pesticides.

Summary

Plant tests will indicate if nitrogen is deficient in your crop, but how much you should add will depend on a wide range of factors such as your yield and protein expectations and risk profile.

Go back to your original N budget. Consider each paddock situation on your farm and determine if each has the potential to respond to additional N and deliver a positive return on your investment.

Be aware of interactions with other nutrients (Cu, S and K) and also be aware of other yield limitations.

Liquid or granule N, it doesn't really matter as long as the total N is correct.

Call you local Summit Area Manager for the right advice on nitrogen this season. Good luck!