

Anhydrous ammonia at TAIC



James Holding and Cameron Cutting inspect the equipment



Anhydrous ammonia tanker



A custom designed tyne for anhydrous ammonia



Canola seedling emergence

- ▶ Have you ever contemplated using anhydrous ammonia up front at sowing?
- ▶ How high can you go with ammonia rates?
- ▶ Is there a risk of fertiliser toxicity to seedlings?
- ▶ How does the N efficiency of ammonia compare to urea?
- ▶ What is green ammonia and how can it reduce our on-farm emissions footprint?
- ▶ FarmLink has partnered with the Norman family, based near Illabo, on an exciting 3-year project with the aim of answering these questions.

Project background

The Norman family run a 2000ha mixed farming operation and have been using anhydrous ammonia for 20+ years. Over this time, they have modified their seeder to enable the safe application of ammonia under different crop types at sowing. This project will draw on their first-hand experience and utilise their modified seeder to sow the farm at TAIC and importantly, 2 large scale replicated trials.

Anhydrous ammonia as a fertiliser source is not new but the way it can be manufactured is new. This innovation at the manufacturing level has resulted in a green ammonia product that has the potential to reduce on-farm greenhouse gas emissions and move farms closer to net zero.

Green ammonia

Conventional or brown ammonia is made using fossil fuels (typically natural gas) as the feedstock. However, green ammonia does not rely on fossil fuels and instead uses renewable energy sources, and air and water to produce ammonia. This means the greenhouse gas footprint is much lower than that of brown ammonia.

Nitrogen fertilisers are the largest source of greenhouse gas emissions on farms and this project will show the potential of green ammonia to reduce these fertiliser-derived emissions.

What is happening at TAIC?

We have sown 2 large paddock scale replicated trials in wheat, and canola, with a range of differing ammonia and urea rates. These trials will aim to answer 3 key questions:

1. How much will our greenhouse gas emissions be reduced by using green ammonia?

The higher the ammonia rates, the more we will offset the requirement for in-crop urea and therefore allow a larger proportion of our total applied N to come from green ammonia. This will then provide a significant greenhouse gas reduction benefit.

2. However, how high a rate is too high?

There is a risk that high rates of ammonia could cause seedling death and we aim to show at what rate this becomes a significant risk.

3. Nitrogen losses and efficiency.

We will test whether different nitrogen fertilisers, either ammonia or urea result in varying nitrogen losses or grain yields.

The remainder of TAIC will demonstrate the transition towards decarbonisation. We will be measuring our soil carbon, recording our on farm-activities (diesel, chemical and fertiliser etc) and inputting this data into the globally recognised Cool Farm tool to estimate our greenhouse gas emissions in each paddock.

No rush to apply urea post sowing

Across all TAIC crops (non-trial area), we have applied 97kg/ha of ammonia gas at sowing (80 kg/ha N or equivalent to 173kg/ha urea). Going early with high rates should help reduce post sowing workloads, farm logistics and this early N will likely have a higher nitrogen use efficiency compared to later season top-dressed N.

Applying high rates of N early in the season also has obvious similarities to some of the N banking work done by James Hunt (University of Melbourne) and others. N banking is focused on applying N early, regardless of seasonal outlook. Research has shown that often the N losses are minimal and therefore maintaining a neutral to positive N balance across years is advantageous to maximise profit and slow organic matter decline.

Ray Norman says "we like putting a high nitrogen rate up front and even if it isn't used, we are confident that it will be there for next year's crop"

A weapon in the war on slugs

There are also anecdotal reports that applying anhydrous ammonia up front has a suppressive effect on slug pressure. We are seeing this, with our emerging canola plants not disappearing, even around dams and watercourses. This is a welcomed benefit in what is a high-pressure year for slugs and especially with the high cost of baiting.