

ENHANCED EFFICIENCY FERTILISERS IN COTTON



Author:
Jon Baird
(NSW DPI & CottonInfo)

FACT SHEET MAY 2024

Nitrogen is critical in our cropping systems to fulfil their yield potential.

Nitrogen is sourced from a range of places, including the soil in the form of organic nitrogen from decayed plant and microbial residue. While nitrogen sourced from the soil is highly efficient, we commonly apply synthetic nitrogen fertiliser to fulfil the requirements of high yielding crops.

The application of synthetic fertilisers is one of the highest input costs for farmers, but unfortunately, they can have low efficiency. Improving nitrogen fertiliser efficiency improves the sustainability of cotton systems, reducing the harmful effects of excess nitrogen losses.

One key method to improve fertiliser recovery and reduce losses is using Enhanced Efficiency Fertilisers (EEF).

EEFs contain a physical or chemical barrier that delays the release of nutrients into the surrounding environment.

There are currently three core EEF's used in cotton systems:

- Nitrification inhibitor: this prevents the conversion of ammonium to nitrite and nitrate by suppressing the Nitrosomonas bacteria within the soil.
- Urease inhibitor: this prevents the conversion of urea to ammonium by hydrolysis, which uses an enzyme called urease.
- Coated fertilisers: granular nitrogen fertilisers are coated with a barrier (in most cases, a plastic or chemical polymer) that prevents water from contacting the N source.

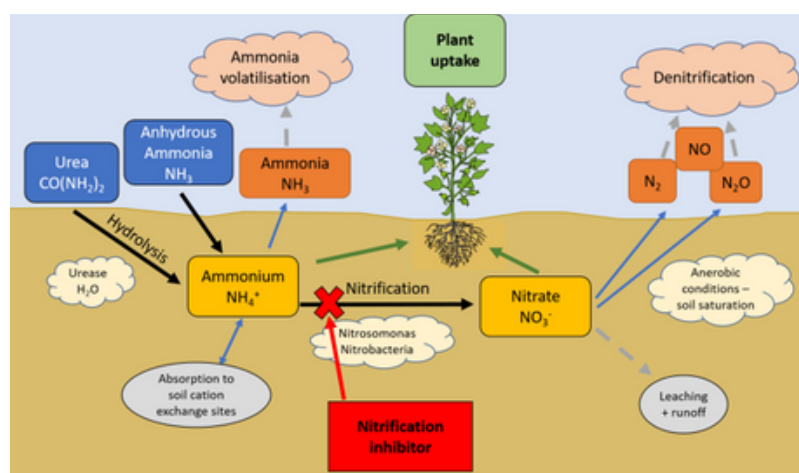


Figure 1. Nitrification inhibitor preventing fertiliser-N cycling to nitrate-N



IS A JOINT INITIATIVE OF



BEST
PRACTICE
✓

ENHANCED EFFICIENCY FERTILISERS IN COTTON

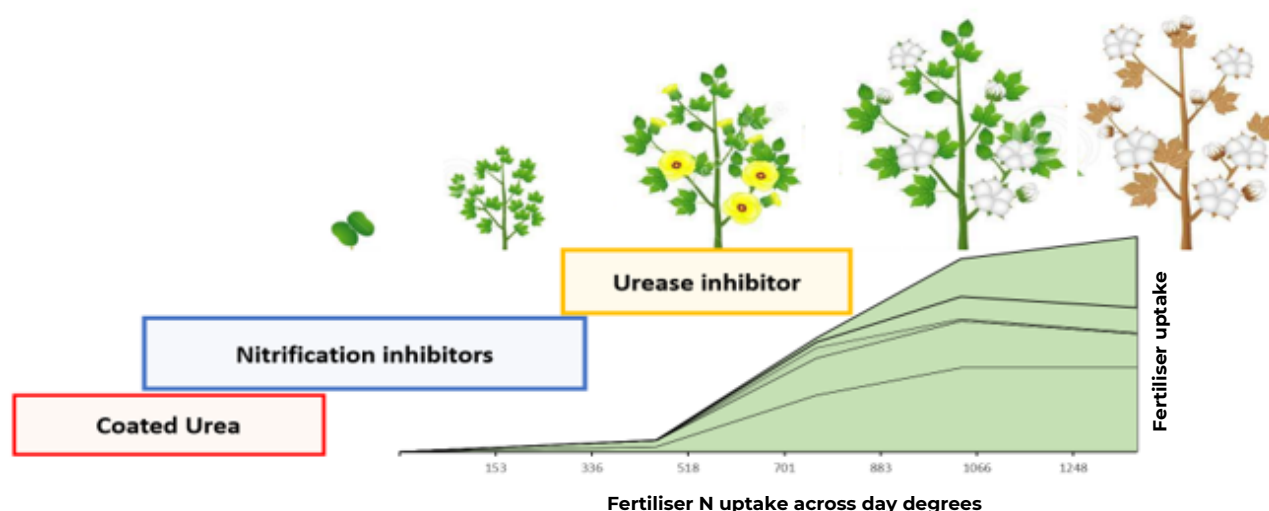
CottonInfo

FACT SHEET

How inhibitors work and when to apply in cotton:

- Nitrification inhibitors prevent the nitrification process by restricting or reducing the number of microbes responsible for converting ammonium-N to nitrate-N. The fertiliser N will stay as ammonium for an extended period (up to 3 months). In cotton systems, this product works best when applied pre-plant or early season when crop nitrogen uptake is low (i.e. application by first flower), reducing losses associated with the early season irrigation events.
- Urease inhibitors prevent the conversion of the fertiliser to plant available nitrate. They do this by blocking hydrolysis, where urea is converted to ammonium-N. When suitable moisture does arrive, the degradation of the inhibitor active occurs and the hydrolysis process is similar to un-treated urea. The inhibitor has a relatively short period of activity, approximately 10 days. The use of urease inhibitors is suited when urea is broadcast on the soil surface during periods of unpredictable storm/rainfall events, and incorporation of the fertiliser will be delayed.
- Coated urea contains plastic or plant oil coats which degrade and release the fertiliser slowly over time. The release period depends on coat product, thickness, environment conditions (temperature and moisture) and microbial activity. Typical release periods range from 30 days to over 280 days for prolonged fertiliser release. These products are suited to pre-season application timing dates, especially when the fertiliser is applied for an extended time (six or more months prior to planting).

Ideal timing for enhanced fertiliser application in cotton:



If you are interested in using enhanced fertilisers, it's recommended that growers perform their own strip trials within their farming operation. The CottonInfo Nutrition Tech lead or your local Regional Extension Officer can help you find the product that best suits your system.

For further information:

Visit www.cottoninfo.com.au

Contact Jon Baird, NSW DPI & CottonInfo Technical Lead via 0429 136581 or jon.baird@dpi.nsw.gov.au

DISCLAIMER: These products may not improve the efficiency of your existing management plan or reduce losses when timing or placement is not ideal. Therefore, these products must still be aligned with the best nitrogen management guides.