PROJECT CATALYST

PRACTICE FACT SHEET

NITRATE INHIBITORS: SAVING NUTRIENTS FOR PLANT AVAILABILITY

Project Catalyst is a grower-led innovation project in sugarcane that was formed to explore, validate and broadly adopt management practice changes for productivity gains and improved water quality for the Great Barrier Reef.

DISCOVER THE ADVANTAGES

Fertiliser represents a major input cost to farming sugarcane and as prices continue to increase due to global market forces, growers are seeking alternatives. As industry faces the greatest challenge to decarbonise and become more sustainable, many farmers are adopting Enhanced Efficiency Fertilisers (EEFs).

This Practice Change Fact Sheet seeks to explain the advantages of Nitrification Inhibitors, which slow the conversion of ammonium to nitrate in urea fertiliser, (the most used N fertiliser).

Nitrate or Nitrification inhibitors are already playing a pivotal role in modern agriculture and environmental stewardship. These chemical compounds are employed to better match Nitrogen supply to plant needs while helping to mitigate the negative impacts of nitrate pollution on water quality - making them essential tools for sustainable land use.

After the urea has hydrolysed to ammonium in the soil, the inhibitor prevents the further conversion of ammonium to nitrite and nitrate by suppressing the Nitrosomonas bacteria within the soil, thereby minimising potential for nitrate leaching and subsequent groundwater and stream contamination while improving plant Nitrogen Use Efficiency.

The various nitrate inhibitors on the market come in a liquid chemical form that is sprayed onto conventional nitrogen fertilisers at pre-determined rates, typically at fertiliser blending and bagging plants. With the growing availability of nitrate inhibitors in the sugar cane growing areas the premium for treated products has fallen to around $50-60 per hectare in typical fertiliser ratooning blends – making their use a relatively inexpensive insurance strategy.

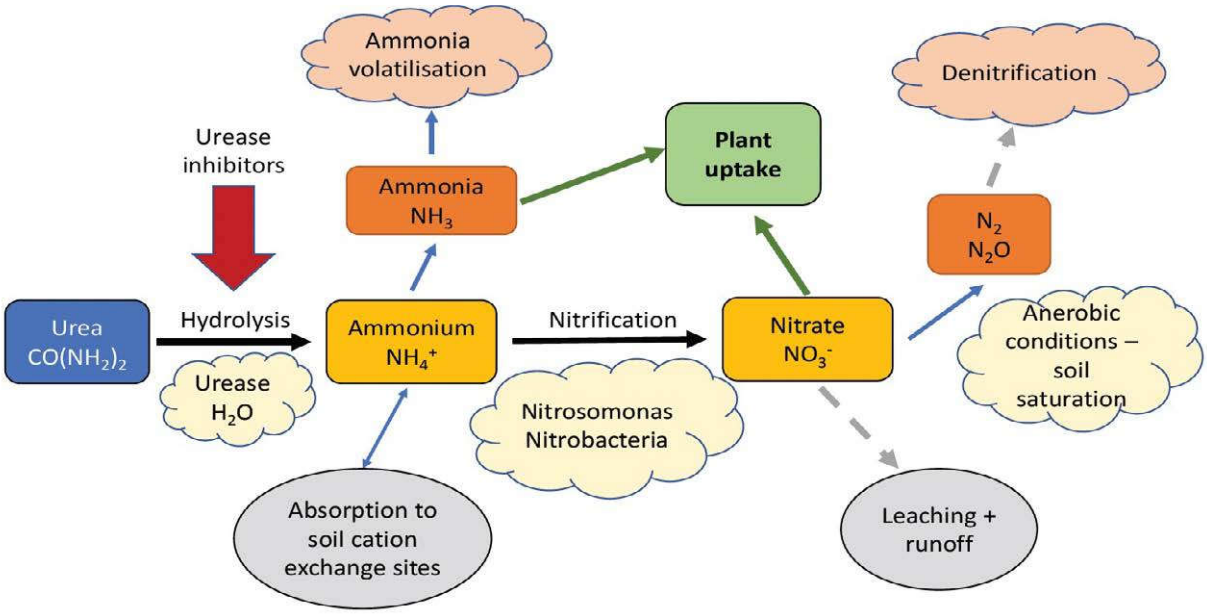
Broadcasting urea poses risks and losses for both the crop and the environment. On an established crop with timely rainfall or irrigation the N loss via ammonia volatilisation is very low. When spread on the soil surface there is potential for N losses via two pathways:

Runoff – if rainfall following application exceeds the rate of infiltration.

Ammonia volatilisation – when dissolved, urea converts to ammonium via hydrolysis, a chemical process that creates a short-lived highly alkaline zone around the urea granule, resulting in emission of ammonia gas.

The potential loss of N is increased by factors including rainfall (less than 20mm), high humidity or heavy dew, presence of crop residues, open canopies, high temperatures and wind (conditions with high soil surface evaporation) high soil pH, and soils with low cation exchange capacity (CEC).

Applying NI fertiliser sub-surface with a 3 row stool splitter ensures nutrient retention



ADVANTAGES OF NITRATE INHIBITORS

1. Water Quality Protection: Nitrate inhibitors act as a barrier against nitrate runoff into water bodies, preventing harmful effects like eutrophication and the creation of "dead zones" in aquatic ecosystems.
2. Environmental Sustainability: By curbing nitrate pollution, these inhibitors support the conservation of biodiversity and protect fragile ecosystems.
3. Agricultural Efficiency: Nitrate inhibitors enhance nutrient use efficiency in agriculture, reducing the need for excessive fertilisation while maintaining crop yields.
4. Regulatory Compliance: Many regions have strict regulations regarding nitrate levels in water bodies, making nitrate inhibitors a vital tool for compliance and avoiding penalties.

CONCLUSION

Nitrate inhibitors are indispensable for safeguarding water quality, promoting sustainable agriculture, and ensuring environmental compliance. Their application represents a cost-effective and responsible approach to managing nitrogen fertilisers, fostering a healthier and more sustainable environment.

Watch our 4 minute video on how this practice is being adopted by growers in the Mackay region:
https://youtu.be/uwQwmu3CTmg

Aaron Butt fertilises his ratoons directly after harvest

David Titmarsh utilises nutrient plans and GPS to improve productivity and profitability

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