



Science brings nitrogen back to earth

A national research program has been scrutinising applied nitrogen use, to significantly lower fertiliser costs for sugarcane farmers, and to reduce wastage that ends up as an environmental hazard.

Improved nitrogen use efficiency (NUE) in sugarcane with the aim of increasing returns from investment in nitrogen fertiliser is the clear objective of advice provided by Queensland-based Paul Keevers from Tableland Fertilizers in Atherton.

A Fertcare® Accredited Adviser, Mr Keevers provides fertiliser advice and recommendations for sugarcane growers on the Atherton Tablelands.

He draws on the SIX EASY STEPS™ program to determine nitrogen rates based on realistic yield expectations and nitrogen fixed in the soil where soybeans are grown in rotation with sugarcane.

Where soybeans are used in rotation with sugarcane, applied nitrogen rates are further reduced by up to 30 percent or 30 to 40kg/ha, meaning an extra cost-saving of \$30 to \$40/ha, he says.

In situations where soybeans are incorporated into the soil as a green crop instead of harvested, nitrogen rates can be reduced by as much as 45 percent or 44kg to 55kg/ha.

However, Mr Keevers says that in addition to this cost-saving, incorporating a green soybean crop also lifts overall soil health because it allows for better microbial diversity and moisture-holding capacity.

Although there is still some uncertainty surrounding how much fixed nitrogen will become available to the following sugarcane crop and when, Mr Keevers is confident that growing soybeans in rotation and more realistic, farm-based assessments of yield potential can significantly boost NUE in sugarcane farming systems.

Better NUE means more profit for clients and less adverse environmental impacts when nitrogen inputs are lost through nitrate leaching in the soil and into the atmosphere as emissions of nitrous oxide (N₂O) gas.

N₂O is a greenhouse gas about 300 times more potent than carbon dioxide that remains in the atmosphere for 114 years.

The National Agricultural Nitrous Oxide Research Program (NANORP) is looking at ways to increase NUE on farms to improve the agricultural economy and reduce N₂O emissions.

The findings of a NANORP research project led by Dr Weijin Wang from the Queensland Department of Science, Information Technology and Innovation (DSITI) are consistent with the advice that Mr Keevers provides for his farmer clients.

In trials at Bundaberg, Queensland, growing soybeans in the fallow period between sugarcane crops reduced N_2O emissions by 55 percent compared with bare fallow followed by conventional fertilisation.

The research showed these greenhouse gas emissions were further reduced in situations where no-till was used, or where a nitrogen catch-crop, such as triticale, was grown in the phase between the soybeans and sugarcane.

These measures were not found to increase sugarcane yields, but the damaging effects of applied nitrogen losses as N_2O were substantially lower, and using soybean in rotation returned about \$400 to \$590/ha more income than bare fallow.

Mr Keevers is also experimenting with coated urea products to help boost NUE in sugarcane farming systems.

At this stage, he says the higher price of coated products are not cost-effective options, but he is “watching this space” with a focus on how they can best be used to increase profitability in the event of a price drop or legislative changes in Australia (already implemented in other countries) that require their use.

Mr Keevers’s outlook is echoed by the findings of Dr Wang’s NANORP research exploring use of polymer-coated urea and urea coated with the nitrification inhibitor 3,4-dimethylpyrazole phosphate (DMPP).

Polymer-coated urea creates a physical barrier around fertiliser prills that slows the release of nitrogen to plants, whereas the nitrification inhibitor-coated urea slows the biological oxidation of ammonium or ammonia to nitrate.

Both coated urea products aim to better match the release of nitrogen from prills to the crop’s demand for this nutrient essential to growth.

More information

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Growers are increasingly looking at the role of legume crops and their role in relation to the crop-cycle and improving nitrogen use efficiency. Pictured is Burdekin grower Tristan Cox and daughter Liana earlier this year in a crop of mung beans, which have improved subsequent cane yields.