

Controlled-release fertilisers: unravelling the mystery

Project details

Key Focus Area:

Soil health and nutrient management

Project name

Role of controlled release fertiliser in Australian sugarcane systems

Project number

2014/011

Principal provider

CSIRO

Project end date

July 2017

Controlled-release fertilisers (CRFs) have been promoted as an option for reducing nitrogen losses, but a research project is confirming that it is crucial that applications be matched to the needs of the crop in order to capture both an on-farm economic outcome, and an environmental outcome.

A research project looking at CRFs in sugarcane farming systems is unearthing important information about how these fertilisers work and interact with the crop.

The research is being conducted by the CSIRO and is bringing together a vast array of information from trials on CRFs from previous research, as well as current research activities. It is using this information and also computer modelling to help provide guidance for farmers, advisors and researchers in relation to these fertilisers. It is doing so specifically for sugarcane farming systems.

CSIRO researcher Kirsten Verburg said that despite the many trials that had been undertaken on these fertilisers, there were many unanswered questions.

"Sometimes the trials see positive results, and sometimes they do not. We want to know: why is that? What does that mean for a particular soil or climate?"

The research is funded by SRA and it is already observing some important points about CRFs. "The early results are confirming that different products have

different release patterns, and also that there is a strong temperature effect on the rate of release," she said.

"So the same fertiliser used in north Queensland may release faster than it would in the south, just as it would release faster in November than it would in August. We also know that one CRF product is not the same as another product.

"At the moment, there is not a large range of CRF products available within the Australian sugarcane industry, but if you look worldwide, there are many. That is why these observations are important.

"Ideally, the product releases just when the crop needs the nutrient. So if we can learn more about when the crop needs nutrients and when the fertilisers are releasing, then we can find a better match."

By releasing the urea slowly, CRFs may be able to reduce nitrogen losses such as those occurring through runoff, into the atmosphere, or through leaching. A crucial aspect of ensuring the products could provide value is matching the release of the fertiliser to the needs of the crop.

Given that CRFs are generally more expensive than traditional fertiliser, the research is targeting the question "where and when will they make a difference?".

The answer is far from simple and is strongly linked to the nitrogen rate, the conditions, and losses.

"You may get a benefit in terms of yield in situations where you have nitrogen loss and the CRF reduces that loss, provided the crop can use that extra nitrogen," Dr Verburg said.

"We already know that with nitrogen, the crop reaches a point where the yield just does not increase further and the yield plateaus.

"So when we look at CRFs, you may get a yield increase if you are not quite at that plateau and the crop still responds to extra nitrogen. This means that CRFs may allow a reduction in the rate of fertiliser nitrogen applied."

The project will now delve deeper into these findings to understand the fertiliser release patterns and timing of crop nitrogen demand in more detail, and these results will be communicated to the industry.