Joe and Christine Muscat

Use of Controlled Release Urea in Sugarcane Production

REGION: Mackay Whitsundays | Oakenden

Joe and Christine Muscat have a long history of bringing innovation to the Mackay Whitsunday region. The couple grow sugarcane with rotational fibre crops on 130 Ha in the Oakenden area within the Sandy Creek catchment, South-West of Mackay.

The Muscat's farm was fully converted to 1.8m rows with controlled traffic in 2008. They get the most out of the controlled traffic system by using RTK GPS guidance.

Upgrades to the Muscat's farm, such as a change to zonal tillage and EC mapping for soil and nutrient management, have been funded through the Australian Government's Reef Rescue/Reef Programme Water Quality Improvement Grants.

Through Project Catalyst Joe receives agronomic advice for on farm management which he says in invaluable. His farms have been EC mapped and soil tests are taken to guide his nutrient management. Nutrients are typically applied with Liquid One Shot and rates are varied by paddock. All fertilisers are applied under the stool using a variable rate stool splitter.

Herbicide management on the property is done early in the season with a mix of old and new pre-emergent sprays such as Flame and Velpar. "The majority of my weed control comes through double cropping with the rotational crops. The weeds are never out of control as they would be if I had a true fallow which means I use a lot less chemicals over all," explained Joe.

Joe has been experimenting with rotational crops for more than fifteen years and in this time has brought new crops to the region and founded markets for legume, fibre, seed and oil crops. Some of the rotational crops that Joe grows include maize, peanuts, soy, kenaf, sun hemp (a legume) and industrial hemp (which was grown for grain with the oil used in cosmetics).

Issues being addressed

The Muscats' farm has a significant proportion of sandy soils, which, along with the tropical wet season rainfall means there is a significant risk of nutrient loss from the cane system. These losses contribute to poor water quality and reduced productivty through dissolved inorganic nitrogen (DIN) losses and poor nitrogen use efficiency.

Solution being tested

Controlled Release Urea offers the opportunity to better match nutrient supply to the plant growth needs resulting in improved nitrogen use efficiency and better water quality leaving Joe and Christine's farm. In this trial Joe will try a combination of 25% CR-Urea and 75% urea blend.

Understanding the economic implications of a practice change is a vital step in the Project Catalyst trial process. If a practice has good economic outcomes it is worth investigating further and promoting to the wider community. If the economics do not stack up the team needs to go back to drawing board.

In order to evaluate the economic implications of CR-Urea on Joe's farm an analysis estimating the profitability of the trial termed a Net Present Value (NPV) was completed. A gross margin (GM) was calculated before and after the trial to capture the changes in this production system. A NPV evaluates the future benefits in today's dollar terms, this allows the capital costs incurred at the beginning of an investment period to be compared to the stream of benefits accrued across the investment period, and bought back into todays dollars terms.

Key economic drivers for change

- Increased nitrogen use efficiency
- Improved water quality
- Potential yield increases

Key assumptions

- Existing capital was able to be utilised
- Analysis assumes that change takes place across the whole farm
- 25% CR Urea and 75% Urea blend was used
- Inputs, CCS and yield were assumed to be the same over the 10 year

Results to date

It is expected that the change in farming practices will result in a negative change in gross margin and net present value. The results indicate that employing the proposed Agrocote/ Urea blend on ratooning blocks is unlikely to be an economically viable investment. This result is driven primarily by the higher price of the CR-Urea product, which ranges in terms of relative costs from between 1.75 to 10 times the cost of granular urea.

Left:
Joe Muscat on his property in Oakenden. Joe has been experimenting with rotational crops for more than fifteen years and in this time has brought new crops to the region and founded markets for legume, fibre, seed and oil crops.

Left:
Joe in his crop.

Below:
In 2013, Joe received the Nuffield Scholarship supported by the Sugar Research and Development Corporation to support his research into best practice in production, manufacturing and marketing of fibre crops. The scholarship allowed Joe to take a six week tour of six countries to see numerous examples of how fibre crops are transformed into new products through secondary manufacturing.

Year	0	1	2	3	4	5	6	7	8	9	10
Change in GM ($/ha)	0	-76	-76	-76	-76	-76	-76	-76	-76	-76	-76

Water quality benefits

It is estimated that the Mackay Whitsunday community value a one per cent reduction in Dissolved Inorganic Nitrogen (DIN) at $1,038,995. The CR-Urea application has the potential for water quality benefits for the Sandy Creek catchment, although this is not directly quantified as yet. The table below shows the variance in DIN that has occurred in the past four years in the whole Sandy Creek catchment due to a mix of wet and drier years. It will take a whole crop rotation to have observed monitored load change in DIN.

DIN monitored discharge from the Sandy Creek Catchment

Time Period (Yr)	2009-2010	2010-2011	2011-2012	2012-2013
DIN (T)	85.9	85.0	23.7	41.6
Discharge GL	364.6	627.0	351.6	264.9

Conclusion

The Muscat's trial highlights the negative economic consequences of CR-Urea given the high price of the product. The trial is still in the early stages and the potential benefits of the product are not fully understood nor are the water quality outcomes. The trial will continue to be monitored to improve the assumptions used in this analysis. All values used in this analysis are specific to the Muscat's and if you are seeking to adopt this practice seek individual economic advice.

Thanks to QDAFF and Farmacist for support with this case study.

Contacts

Rob Eccles, Catchment Solutions
M: 0439 308 179
E: reccles@catchmentsolutions.com.au

Andrew Law QLD Department of Agriculture, Fisheries and Forestry
Ph: (07) 4923 6210
E: andrew.law@daff.qld.gov.au

Megan Star QLD Department of Agriculture, Fisheries and Forestry
Ph: (07) 4923 6225
E: megan.star@daff.qld.gov.au

PHOTO: Denis Pozzebon standing in a new herbicide trial in 3rd ratoons, 8 weeks after spraying.

Bayer CropScience is proud to partner with the Project Catalyst Group, working with some of the most progressive growers in the Australian sugarcane industry. Together, Bayer CropScience and Project Catalyst growers are highlighting changes in the management practices of weeds, diseases and insects in the sugarcane industry.

BAYER

"Working towards similar goals with growers and like-minded people involved with Project Catalyst is extremely rewarding." - **Tim Murphy, Territory Sales Manager Bayer CropScience**

"Together, we're identifying solutions for more effective farming through innovative application techniques and trials," said Tim.

Throughout the partnership, Bayer has assisted Project Catalyst growers, analysing how they can use pesticides across a more strategic program. This includes looking for a more practical way of controlling weeds with highly effective herbicides, and setting up necessary equipment for the management of cane grubs.

Part of Bayer's continued commitment to providing the latest information to Project Catalyst growers, Sue Cross, Head of Development for Bayer CropScience Australia will present to the group on some of the changes and challenges that the AgChem industry is facing. Sue has been involved in product development in the crop protection industry for over 25 years, both in Australia and internationally and brings a perspective on a number of issues of local and global relevance, particularly in the area of company investment, research and development and regulatory topics.

As global trends change and technology becomes increasingly accessible, growers continue to look for the next advancement in pesticide use. In conjunction with the Project Catalyst team, Bayer CropScience is working closely with a number of growers to establish trial sites that assess the use of Balance® as a Variable Rate application.

The application and control gained from Balance is dependent on soil type. It is hoped that this research will demonstrate that as soil types change, the application rate of Balance can also be adjusted. This will result in a more efficient use of herbicides as growers will have the ability to alter the Balance rates for different blocks based on soil type. Tailoring the application rate of Balance to the soil will also reduce the possibility of underdosing in heavy soils, and overdosing in light or low CEC soils where transient bleaching is sometimes seen.

A number of factors now make Variable Rate Balance possible in the sugarcane industry. The use of EM mapping, which identifies changing soil types within blocks, will help determine an appropriate rate of Balance through soil testing. Application equipment is also readily available, enabling spray rates to accurately change whilst moving across the block.

In addition to this, Bayer CropScience gained registration of a rate range for Balance of 100 to 200 g/ha.

Whilst trials are still in their infancy, results to date indicate that the level of weed control across a block where Balance has been applied as a variable rate according to soil type is equal to, if not better than, a block with the standard Balance rate. In this trial, the Balance rate per block is reduced in all blocks treated to date. This not only provides savings to the grower but also has the potential to reduce the environmental impact where appropriate run-off mitigation measures have not been carried out. Further results will become available as trials continue.

Part of Bayer CropScience's broader commitment to Project Catalyst growers is to ensure they have access to the latest innovation and new technology. In December 2014, a trial for a new sugarcane knockdown herbicide was applied in one of Denis Pozzebon's ratoon blocks. This was the first large area where a grower applied trial was established in the Australian sugarcane industry.

This new, knockdown herbicide is being compared to the traditional paraquat and 2,4-D knockdown mixes this season. Preliminary results indicate the new herbicide offers effective control of existing vines and broadleaf weeds, as well as picking up any grasses in the block.

The herbicide also offers an outstanding rotation partner to glyphosate in a shielded sprayer system, removing the potential for broadleaf weeds and vines to become the dominate weed in any system.

Please take the time to come and talk to any of the Bayer people at this year's forum ■