Catalyst Project Report – Final report

Reduced N following variable soybean crop

Grower Information	
Grower Name:	Andrew Deguara
Entity Name:	MELANDY HARV. CO PTY LTD
Trial Farm No/Name:	MKY-03046A
Mill Area:	Mackay Sugar
Total Farm Area ha:	195
No. Years Farming:	
Trial Subdistrict:	Pinevale
Area under Cane ha:	150

Background Information

Aim:
To determine the rate of nitrogen reduction possible on a plant cane crop following a soybean fallow affected by severe flooding.

Background:
Soybean are commonly planted during a fallow season to assist in fixing nitrogen in the soil for the following cane crop. The yield of the soybean crop is a reliable indicator of how much nitrogen the soybean plant will have fixed. However, there is limited information available in regard to the amount of fixed Nitrogen lost during a severe rainfall and flooding event. In situations of uncertainty, full rates of Nitrogen are usually applied.

Following cyclone Debbie, many paddocks that had grown a successful soybean crop were inundated with flood water. Nitrate strip tests of these fields indicate minimal available Nitrogen is present in the top 30cm of the soil, however we do not have enough knowledge of this type of situation to determine the amount of Nitrogen fertiliser that should be applied for the following cane crop.

This trial will compare varying rates of Nitrogen topdress application to determine the impact on the cane crop yield. Topdress treatments will include: 0kg/ha of N; 80kg/ha N; 110kg/ha N and 140kg/ha N.

Potential Water Quality Benefit:
Reduction in nitrogen use per hectare following flooding events

Expected Outcome of Trial:
A better understanding of the impact of flooding on Nitrogen fixed from legume crops. Nutrient application better matching plant and soil requirements with no differences noted in the yield of sugar cane

Service provider contact: Farmacist

Where did this idea come from: Grower /Farmacist

Plan - Project Activities	**Date : (mth/year to be undertaken)**	**Activities :(breakdown of each activity for each stage)**
Stage 1	**January 2017**	Plant soybean crop
Stage 2	**March 2017**	Biomass sample soybeans
Stage 3	**August 2017**	Plant cane
Stage 4	**September 2017**	Apply topdress fertiliser according to trial plan – replicated strips
Stage 5	**February - April 2018**	Leaf sample plant cane to assess for nutrient deficiencies
Stage 6	**July-August 2018**	Harvest production

Project Trial site details	
Trial Crop:	Soybean and Sugar Cane
Variety: Rat/Plt:	
Trial Block No/Name:	MKY3046 7-1
Trial Block Size Ha:	5.3
Trial Block Position (GPS):	148.827468, -21.303795
Soil Type:	Uruba - mottled yellow duplex soil

Block History, Trial Design:

											↑
Repetition		1			2			3			North
Treatment	Guard	2	1	3	3	2	1	1	2	3	Guard
No Rows	6	6	6	6	6	6	6	6	6	6	15

Start at Western side Pivot Centre

1. 10kg/ha N Topdress application	50kg/ha SOA	Nil N required high NO3 test result
2. 47 kg/ha N topdress Nitrogen application	230kg/ha SOA	6ES post harvested beans 60N topdress
3. 117kg/ha N topdress Nitrogen application	580kg/ha SOA	Reef Regulations rate

Figure 1 - trial design - Deguara soybean trial

Treatments:

1. **10kg/ha Nitrogen Topdress application – 50kg/ha SOA**
2. **47kg/ha Nitrogen Topdress Nitrogen application – 230kg/ha SOA**
3. **117 kg/ha Nitrogen Topdress Nitrogen application – 580kg/ha SOA**

Results:

Results from the soybean fallow crop:

Three biomass samples were collected from the soybean crop to provide an indication of the level of Nitrogen fixation by the crop. The results from these samples are shown in Table 3.

Table 1 - soy bean biomass results

	Soybean Biomass/1m (g)	wet t/ha	Biomass Wet Weight (g)	Biomass Dry Weight (g)	% Moisture	Dry t/ha	N %	Uptake N kg/ha
Melandy 51	2496	14.1	287.6	108.4	62.3	5.3	2.69	**143.4**
Melandy 52	2056	11.6	371.2	134.6	63.7	4.2	2.57	**108.6**
Melandy 53	2436	13.8	341.2	112.5	67.0	4.6	2.51	**114.2**

As can be seen the average level of Nitrogen available to the following cane crop is 122kg/ha. This indicates that minimal application of Nitrogen as granular fertiliser should be required for the cane crop. However, following a flood event there is less certainty as to the level of Nitrogen still available in the soil. This trial will be critical in providing an insight into the effect of flood events following soybean fallow crops.

Results from the 2018 harvest are shown in Figure 24.

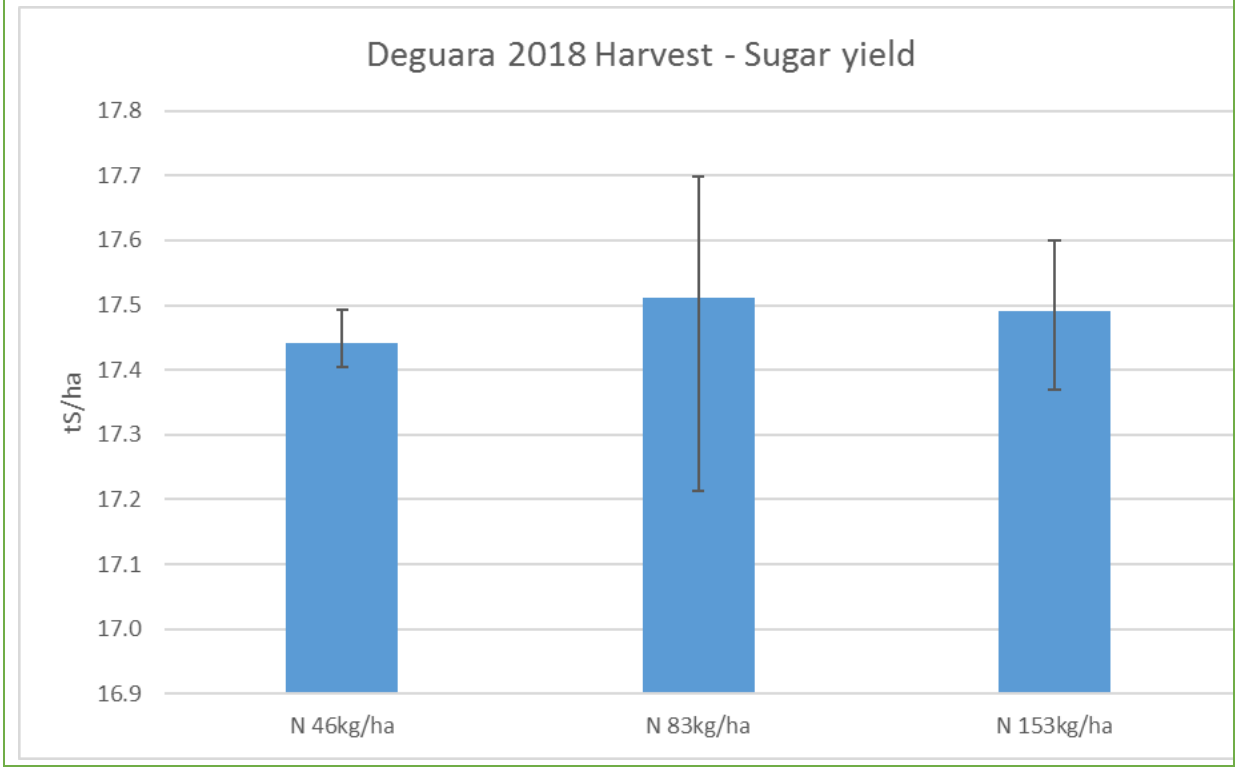

Figure 2 - cane yields 2018

No differences were observed in any treatments in tonnes of cane per hectare or sugar content, therefore sugar yield per hectare. This proves that the soybean crop along with a 46kg/ha nitrogen top dress, provided adequate nitrogen. The extra nitrogen applied in the two higher treatments was unnecessary and by reducing it to the lower rate, costs and environmental impacts could be reduced without hindering crop growth.

Conclusions and comments

Nitrogen in plant cane can confidently be reduced following a soybean crop, where nitrogen remains present in the soil.

Advantages of this Practice Change:
Reduced nitrogen application, resulting in lower costs and environmental risk.

Disadvantages of this Practice Change: None that are of any consequence
Will you be using this practice in the future: **Yes**
% of farm you would be confident to use this practice :All locations where legumes will be grown in a fallow. On our farm we try and use this practice on all fallow.
Site complete