Catalyst Project Report Final report

Reduced N following legumes

Grower Information	
Grower Name:	Gary Lay
Entity Name:	KAJAVI PTY LTD, AVENUE FARM PTY LTD
Trial Farm No/Name:	MKY-04222A, MKY-04191A
Mill Area:	Mackay Sugar
Total Farm Area ha:	128
No. Years Farming:	
Trial Subdistrict:	Homebush
Area under Cane ha:	118

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 don't 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	**June 2017**	Plant cane
Stage 4	**September 2017**	Apply topdress fertiliser according to trial plan – 4-5 treatments, 7 rows wide
Stage 5	**September 2017**	Biomass sample plant cane to assess for changes in yield
Stage 6	**July-August 2018**	Harvest production

Project Trial site details	
Trial Crop:	Soybean and Sugar Cane
Variety: Rat/Plt:	3 different varieties
Trial Block No/Name:	Mky-04191A-07-01
Trial Block Size Ha:	11.22
Trial Block Position (GPS):	149.047047, -21.28568
Soil Type:	Mirani - mottled grey-yellow sandy duplex soil

Block History, Trial Design:

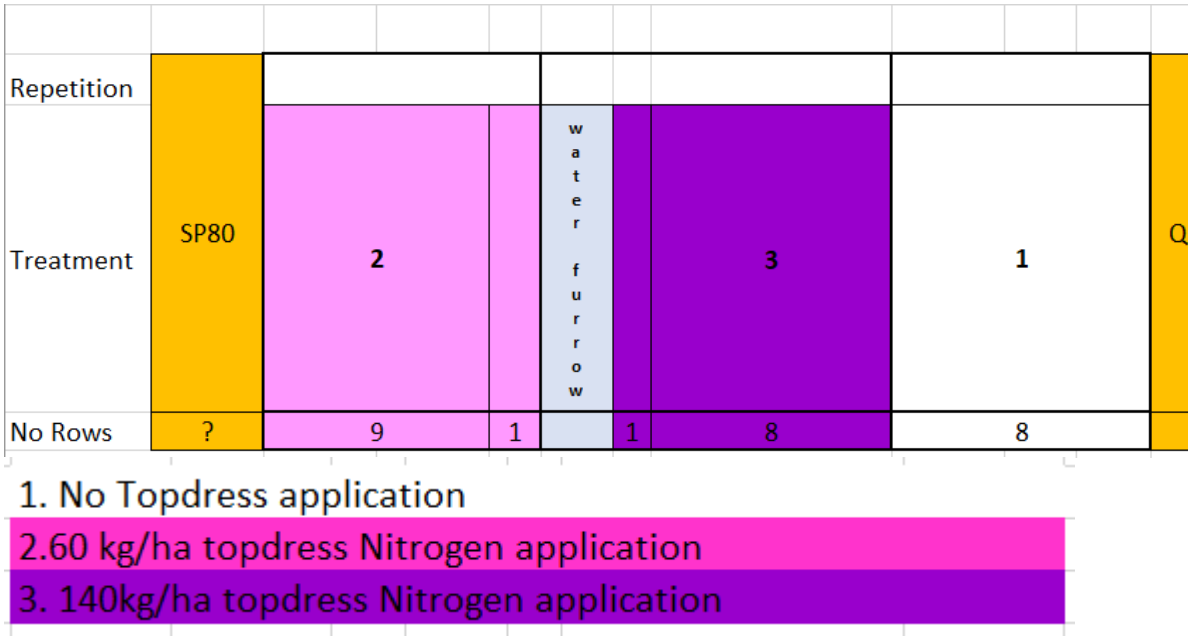

Figure 1 - Trial design - Lay soybean trial

Treatments:
Altered nitrogen rates following whole paddock of soybean that was subsequently flooded
Topdress applications of:

1. **0kg/ha of N**
2. **60kg/ha N**
3. **140kg/ha N**

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 listed in Table 2.

Table 1 - Results of soy bean biomass analysis

	Soybean Biomass/ 1m (g)	Wet t/ha	Biomass Wet Weight (g)	Biomass Dry Weight (g)	% Moisture	Dry t/ha	N %	Uptake N kg/ha
Lay 33	2102	11.9	244.4	73.9	69.8	3.6	**3.12**	112.4
Lay 34	3214	18.2	305.4	89.4	70.7	5.3	**2.95**	157.3
Lay 35	2838	16.1	232.4	73.6	68.3	5.1	**2.7**	137.5

As can be seen the average level of Nitrogen available to the following cane crop is 135.7kg/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. Nitrate strip tests undertaken prior to planting cane indicated available Nitrogen levels ranging between 25 and 75kg/ha.

Results from the cane crop showed very little difference between the cane yield across the three treatments (Figure 21), with the 30 kg of nitrogen to the hectare treatment achieving the highest yield of 141 t/ha and the 90 and 140 kg to the hectare treatments both achieving 137 t/ha of cane per hectare. The sugar yield (Figure 22) also showed minimal differences between the treatments with less than one tone of sugar per hectare difference between the three treatments.

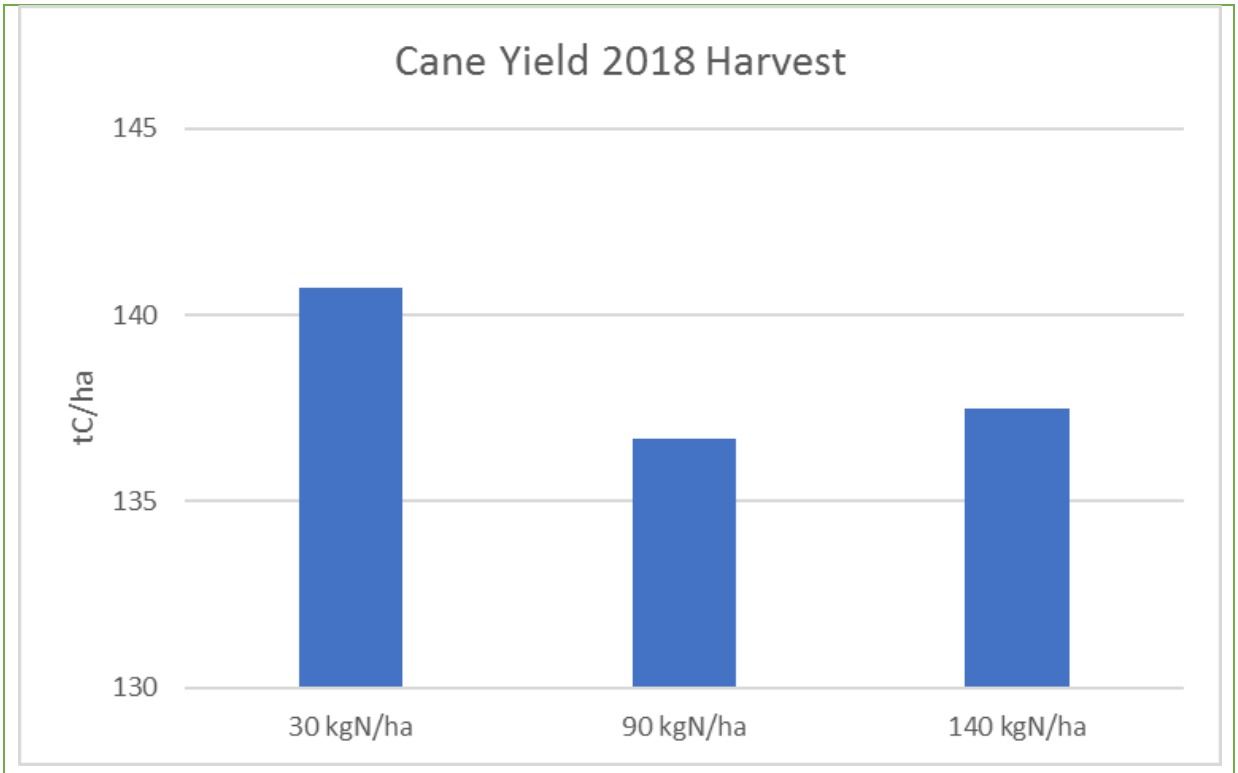

Figure 2 - results of 2018 cane harvest

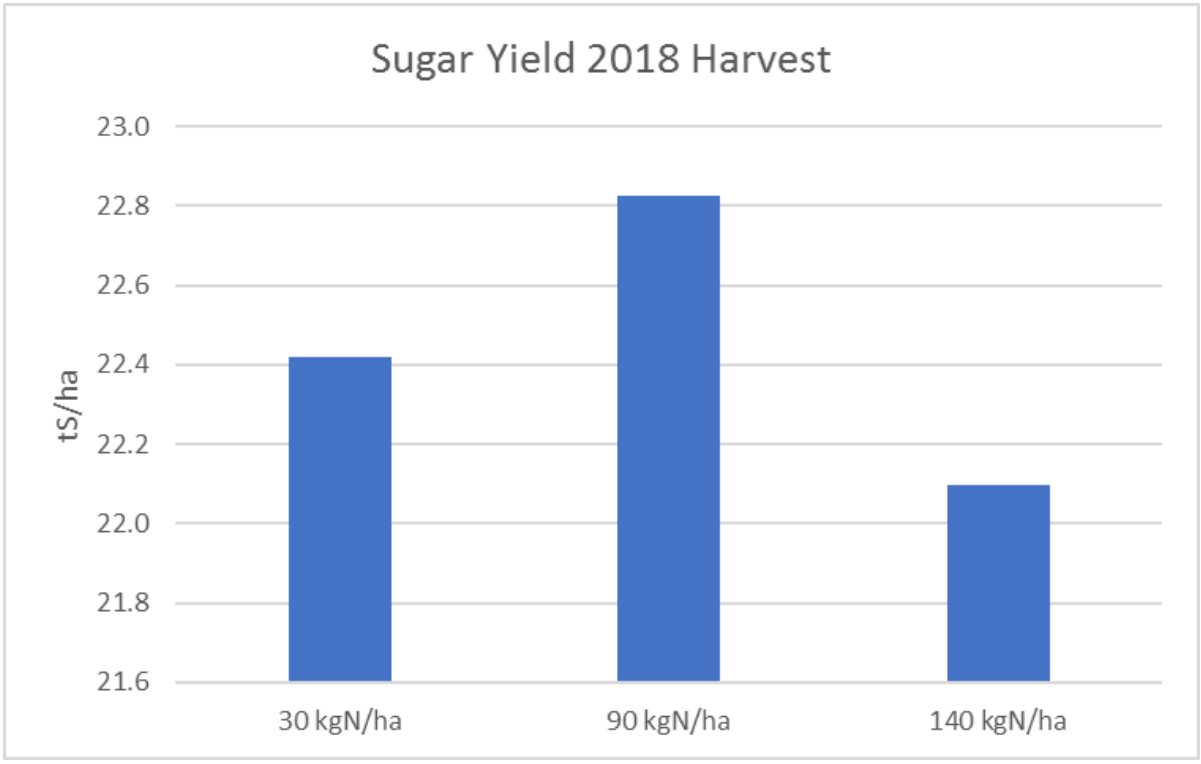

Figure 3 - Results of sugar yields - 2018 harvest

Conclusions and comments

This trial has demonstrated that where a soybean crop was grown and nitrogen has remained present in the soil, plant cane nitrogen fertiliser rates can be drastically reduced. It also shows that nitrate strips are a reliable indicator of the nitrate nitrogen present in the soil, which assists in making a more informed decision about fertiliser requirements at the time of topdressing.

Advantages of this Practice Change:
Reduction in nitrogen application to the field, leading to less risk of losses.
Improved profitability due to lower input costs.

Disadvantages of this Practice Change: Maybe some issues in reducing N rates where there is a highly variable legume crop but on the whole not too many issues

Will you be using this practice in the future: Yes

% of farm you would be confident to use this practice: Where fallow ground has grown a legume crop

Site complete