Project Catalyst Trial Report

Investigating the Effect of Various Nitrogen Rates Following a Harvested Legume Crop

Grower Information	
Grower Name:	Andrew Cross
Entity Name:	MHPF Burdekin Farms
Trial Farm No/Name:	Haughton- 0089A
Mill Area:	Invicta
Total Farm Area ha:	385
No. Years Farming: (Grower Experience)	>10
Trial Subdistrict:	Haughton
Area under Cane ha:	291

Trial Status

Completed

The soybean crop was growing rigorously until a combination of Stem Fly and Target Blotch attacked the crop a few weeks before harvest. When the crop was harvested only 1.5T/ha was obtained. Even though this occurred, the crop was still biomassed to calculate the amount of nitrogen to be deducted for the following sugarcane crop.

The trial block was planted and marked out with three replicates of the three treatments. The nutrients will be applied over three split applications, one at planting containing nitrogen, phosphorus, potassium and sulfur. Another which will occur shortly of potassium and sulfur and one remaining variable nitrogen rate across the treatments.

Background Information

Aim: To determine the most cost effective method of improving water quality and crop NUE through optimising nitrogen rate following a harvested legume crop.

Background: (Rationale for why this might work)
Randomised, replicated paddock strip trial, soil sampling, legume and cane biomass sampling and sugarcane yield and CCS analysis.

While the grower understands there is a water quality and profitability result in reducing nitrogen application after a harvested legume crop, the amount of this reduction is largely unknown in the region.

Potential Water Quality Benefit:
Improved NUE in treatments where N rate is optimised, along with an improvement in soil health in relation to the legume rotation. Both of these factors combined will have a direct water quality impact.

Expected Outcome of Trial:
The grower sees obvious productivity and soil health benefits from a legume rotation, however it is expected that the outcome of the trial will result in allowing the grower to better understand the optimum nitrogen rate following a harvested legume crop.

Service provider contact: Burdekin Productivity Services - 47831101

Where did this idea come from: The grower has been considering the optimum rate of N following a harvested legume crop for a number of years, however the idea of conducting a trial to discover the optimum rate came from interactions with BPS staff and progressing through Smartcane BMP.

Plan - Project Activities	Date : (mth/year to be undertaken)	Activities :(breakdown of each activity for each stage)
Stage 1	Dec 2019	Soil sample and plant legumes
Stage 2	Feb 2020	Biomass sample legumes
Stage 3	Apr-Jun 2020	Plant cane and apply 3 nitrogen treatments
Stage 4	Nov- Feb 2020-2021	Biomass sample cane to determine N uptake
Stage 5	Jun 2021	Harvest trial to determine yield, CCS and profitability and optimum N rate
Stage 6	-	
Stage 7	-	

Project Trial site details	
Trial Crop:	Sugarcane and soybeans
Variety: **Rat/Plt:**	Soybean: A6785 Cane: 208
Trial Block No/Name:	2-1
Trial Block Size Ha:	Total block size= 22.23ha
Trial Block Position (GPS):	19°36'00.4''S 147°06'06.9''E
Soil Type:	Sand to clay loam over light to medium clay.

Block History, Trial Design:

Some block history and trial design pending.

Block history:
Q240 harvested as 3rd ratoon and ploughed out in October/November 2019. Soil test taken and Soybean crop planted in December 2019.

Cane:
9 rows/treatment replicated at 3 times randomly across the block.

Treatments:
Three rates varying 30kg/ha difference in nitrogen. The control rate is 170kg/ha of nitrogen as determined from the soil test results in combination with the Six Easy Steps Guidelines for soybean reduction of N.
The three rates are:
Treatment 1: 110kg/ha N
Treatment 2:140kg/ha N
Treatment 3:170kg/ha N

Results:

Currently:

- **the legumes have been biomass sampled even though they were affected by pests and disease which may have skewed the data but this gave us the amount of nitrogen that was supplied by the legumes to the cane crop that was to follow. This justified our expected cane nitrogen rates of 110, 140 and 170kg/ha.**
- **The cane was biomass sampled at 8-9 months old and the results were anlaysed to see how much nitrogen was taken up in each treatment. Two lots of sampling were taken for stalk and for cabbage and from these results there was much variation even within treatments. It appears that there may have been more nitrogen uptake in the higher N treatment which indicates that the cane is using the N that is available. When the cane is harvested we will be able to see if this follows through and what the impact on CCS and tonnes of sugar are.**

Conclusions and comments

It appears that there may have been more nitrogen uptake in the higher N treatment which indicates that the cane is using the N that is available.

Advantages of this Practice Change:
Enhanced N management and potentially inproved productivity / lower costs

Disadvantages of this Practice Change:
Susceptable to weather and pest issues

Will you be using this practice in the future:
Undecided but yes under the right conditions. When the cane is harvested we will be able to see what the impact on CCS and tonnes of sugar are

% of farm you would be confident to use this practice :
To be decided based on possible future trial work