

Project Catalyst Trial Report

Low Risk Strategy for Growing Legume Crops and Transitioning Back to Cane

Grower Information

Grower Name:	Frank Clayton
Entity Name:	TBC
Trial Farm No/Name:	PSM 01538A
Mill Area:	Proserpine Sugar Mill
Total Farm Area ha:	135
No. Years Farming:	12
Trial Subdistrict:	Bloombury
Area under Cane ha:	128

Trial Status

Completed

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Background Information

Aim: To assess the sugarcane crop impacts of fallow practices that may provide a low risk strategy for growing legume crops and transitioning back to cane.

Background:

It has been demonstrated that the practice of a zero till soybean fallow, followed by zonal bed preparation for planting cane, reduces damage to soil structure and improves a number of indicators of soil health.

Cultivation to prepare paddocks for wet season soybean crop planting can increase soil erosion risk for the period between planting and crop canopy closure. The zero till/ zonal bed integrated farming practice allows growers to maintain valuable soil and nutrient assets within the paddock boundaries. It reduces the risk of soil (sediment) loss from paddock sources whilst increasing the nutrient holding capacity of the soil.

After soybean crops are terminated for plant cane, incorporation of the soybean trash into zonal beds accelerates decomposition. The nitrogen (N) becomes available for plant cane uptake and can provide opportunity for reduced inorganic N fertiliser to be applied.

Potential Water Quality Benefit:

Reduced cultivation greatly decreases risk of soil erosion and therefore a reduction in nutrient run-off associated with sediment losses. Additionally, infiltration rates are greater in minimal cultivated soils, providing increased soil moisture to rooting depth and, consequently, improved crop yield.

Expected Outcome of Trial:

Reduced N runoff and improved crop yield in low tillage areas.

Service provider contact: Farmacist Pty Ltd

Where did this idea come from: Frank Clayton in consultation with Farmacist

Plan - Project Activities

	Date:	Activities:
Stage 1	Jan 2020	Sprayout sugarcane and plant soy treatments
Stage 2	Mar/Apr 2020	Harvest soy for grain
Stage 3	August 2020	Plant sugarcane crop
Stage 4	Dec 2020	Install water quality sampling equipment
Stage 5	Sep 2021	Harvest trial to determine sugarcane yield

Project Trial site details

Trial Crop:	Soy - Sugarcane
Variety: Rat/Plt:	Soy – Leichhardt, sugarcane – Q208
Trial Block No/Name:	47-1
Trial Block Size Ha:	7.06ha
Trial Block Position (GPS):	148.595655, -20.62385
Soil Type:	Wagoora

Block History, Trial Design

Trial Layout

Two treatments were established with four replicates (Figure 1). The treatments were:

T1 - No legumes, cultivated bare grassy fallow, multiple cultivations into plant cane. N @ 6ES fertiliser rates.

T2 - Zero till soy break crop, single rip cultivation plant cane, N rate determined from soil nitrate values

5 rows	6 rows	6 rows		6 rows	6 rows	6 rows	6 rows	6 rows
6 rows - Spray/soybean/Min till/Cane	6 row Spray/Grassy Fallow/Worked/Cane	6 row Spray/Grassy Fallow/Worked/Cane	Winch row	6 rows - Spray/soybean/Min till/Cane	6 row Spray/Grassy Fallow/Worked/Cane	6 rows - Spray/soybean/Min till/Cane	6 rows - Spray/soybean/Min till/Cane	6 row Spray/Grassy Fallow/Worked/Cane
R1T2	R1T1	R2T1		R2T2	R3T1	R3T2	R4T2	R4T1

Figure 1. Trial plan for zero till soy plant/min cultivation sugarcane Vs conventional cultivation

Soybean planting

The paddock was sprayed with glyphosate before soybean was planted (Figure 2) into Treatment 2 and the Treatment 2 fallow was only cultivated after wet season. The soybean (Treatment 2) required herbicide spraying to treat the sugarcane volunteers. The soybean crop established well but increased weed pressure and low irrigation availability reduced crops full potential.



Figure 2. Soy planted direct into sugarcane trash

As Frank has his own grain harvester, in late May he was able to harvest the soybean (Treatment 2). The fallow (Treatment 1) was cultivated in July with off-sets. Both Treatment 1 & 2 were then ripped and wavey-disc'd. A decision was made to also wavy-disc Treatment 2 as the sugarcane stools were brought to the surface by the rippers that had potential to effect the shute planter). Sugarcane variety Q208 was planted (Figure 3) with a shute type planter in August.

Water runoff KP samplers (Figure 4) were installed in Replicate 3 in late August. Low rainfall and soil absorption resulted in no run-off until December.



Figure 3. Soy min-till on right (green peg) and conventional cultivation on left (yellow peg).



Figure 4. Frank Clayton with KP Sampler for collecting run-off water.

Results

The 2020 harvested soybean crop yielded 2.5 t/ha grain and an 'eatable' quality rating.

Soybean grain prices are currently (January 2021) high at >\$750/t. taking into account inputs (cultivation, chemical, seed, irrigation, agronomical advice, harvester and freight), the crop returned >\$550/ha.

The sugarcane crop is established and will be harvest late 2021 providing yield results per treatment.

Conclusions and comments

This project is now complete under this round of funding, however the trial will be continued pending additional funding.

The soybean yield was comparable to district average and it was both grower and Farmacist observation that the soils worked-up much easier after the soybean crop.

Planting soybean direct into cane trash works well when the planter discs can be located on the old bed. Germination diminishes if the seed is planted on the bed shoulder or in the wheel track.

Soybean yield may have increased with improved irrigation management as there were periods of crop stress that would have impacted yield potential.

Advantages of this Practice Change:

Planting soybean into trash cover provided extra weed protection and reduced soil moisture losses. Soil erosion risks were reduced as there was no soil worked prior to the wet season.

Disadvantages of this Practice Change:

Reduced cultivation did not allow for the sugarcane stool to breakdown over the wet season and created difficulties in forming an even bed profile and having a suitable soil cover when planting the sugarcane.

As a soybean crop is generally planted at end of the sugarcane crop cycle, there is an increased risk of weed pressures and this can create control issues during the crop's development.

Will you be using this practice in the future:

The system has potential and with some modifications to equipment and management practices the trial will be continued in 2021.

% of farm you would be confident to use this practice : All of suitable fallow soils- approximately 12%.