Catalyst Project Report – Final Report

Effect of harvester speed on future cane yield

Grower Information	
Grower Name:	Tony Jeppesen
Entity Name:	O'Connell River Harvesting Group
Trial Farm No/Name:	PSM-1440
Mill Area:	Proserpine
Total Farm Area ha:	169
No. Years Farming:	25 years – 3rd Generation
Trial Subdistrict:	Elaroo – O'Connell River
Area under Cane ha:	800 (OCHG)

Background Information

Aim: To investigate the effect of harvester speed on subsequent cane yields and nitrogen use efficiency

Background: (Rationale for why this might work)

There is clear evidence that yield decline in older ratoons has increased at a significantly faster rate since the introduction of mechanical harvesting during the 1960'a and 70's. Pre-mechanical harvesting it was not uncommon for a cane crop cycle to last for more than 10 years without any significant loss of yield. However, currently the average crop cycle lasts for approximately 5 years and during that time productivity declines by about 20%. There is evidence to suggest the production loss is even greater depending on soil types and cane varieties, particularly at high harvester speeds.

This investigation will determine production loss and the effect on NUE in differing soils and varieties harvested at varying speed greater than the optimal.

Potential Water Quality Benefit:

Improved NUE with reduced losses

Expected Outcome of Trial:

Harvester speeds will influence the loss of production in subsequent years. NUE can be improved by either slowing harvester speeds or reducing nutrients to better match cane loss.

Service provider contact: John Turner - Farmacist

Where did this idea come from: Growers

Plan - Project Activities	Date: (mth/year to be undertaken)	Activities :(breakdown of each activity for each stage)
Stage 1	**October 2016**	Harvest 2016 cane crop
Stage 2	**January 2017**	Initial analysis of ratoon crop to detect base line starting point, measure gaps and stalk density
Stage 3	**October 2017**	Harvest 2017 cane crop as per trial plan
Stage 4	**November 2017**	Post-harvest analysis - measure gaps
Stage 5	**January 2018**	Post-harvest analysis - measure gaps
Stage 6	**September 2018**	Harvest trial as per trial plan
Stage 7	**November 2018**	Post-harvest analysis - measure gaps
Stage 8	**January 2019**	Post-harvest analysis - measure gaps

Project Trial site details

Trial Crop:	Sugarcane
Variety: **Rat/Plt:**	Plant cane
Trial Block No/Name:	1440A Block 11-1
Trial Block Size Ha:	9.5 ha
Trial Block Position (GPS):	20.74231, 148.58318
Soil Type:	Eton/Marian

Block History, Trial Design:

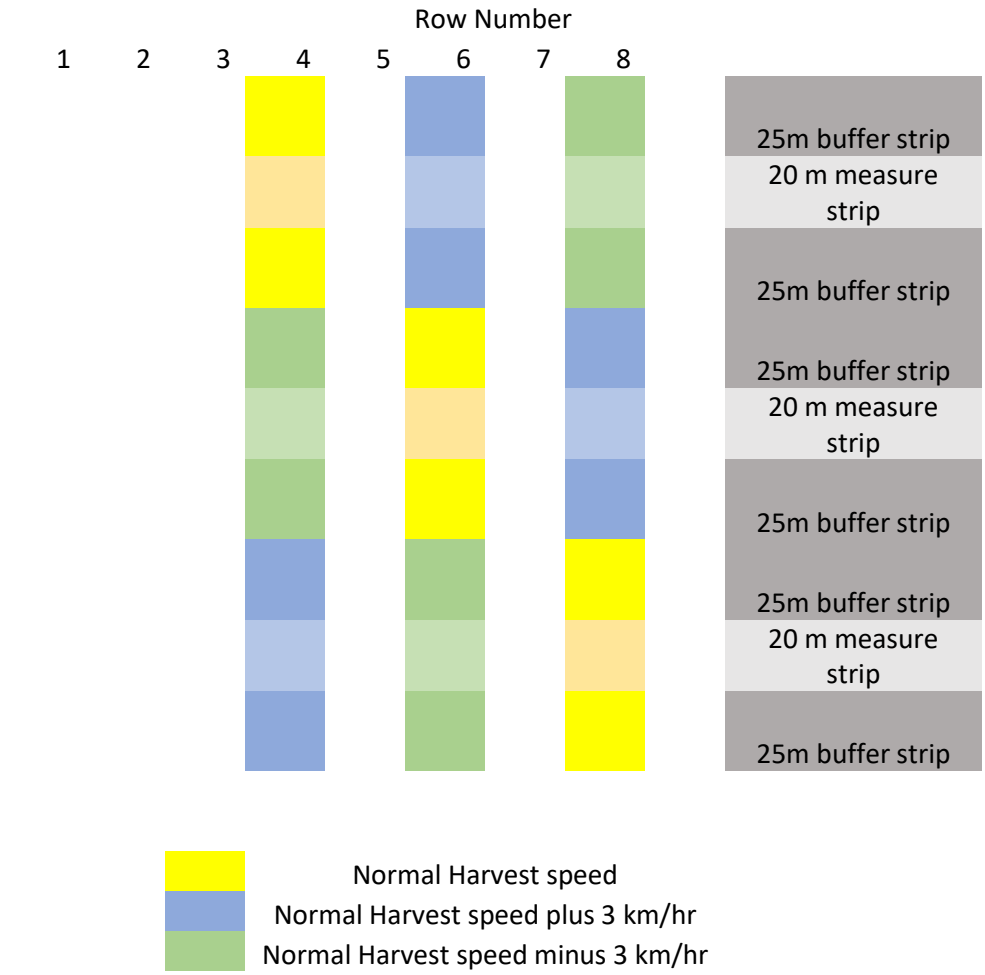

Figure 1 - Trial plan layout

Treatments:

1. Normal Harvest speed
2. Normal harvest speed reduced by 2km/hr
3. Normal harvest speed increased by 2km/hr

Results:

Two sites were analysed for gaps in each of the 20m strips shown in Figure 1, approximately 100 days after planting. The total length of gap measured being less than 5% of the total measuring row for each treatment (Blue bar in Figure 2 and 3). During the harvest of the site, harvester speeds were adjusted to 2 km/hr for Treatment 1 and 6 km/hr for treatment 3, T2 was considered standard practice at 4 km/hr. Gaps were measured at both 15 days after harvest (DAH) and 60 DAH (Orange and grey bars respectively in Figure 2 and 3). As expected, the length of gaps did reduce over time as the cane plant filled in. Unexpectedly, the largest increase in the length of gaps between pre and post-harvest occurred in the sections where the harvester was travelling at its slowest at 2 km/hr (> 600% increase). Given that this was the reverse of what was expected, the result has been investigated and it appears the automatic base cutter height adjuster on the harvester may have contributed to the result. When conducting the trial in 2018, this equipment will be disabled during the investigation period.

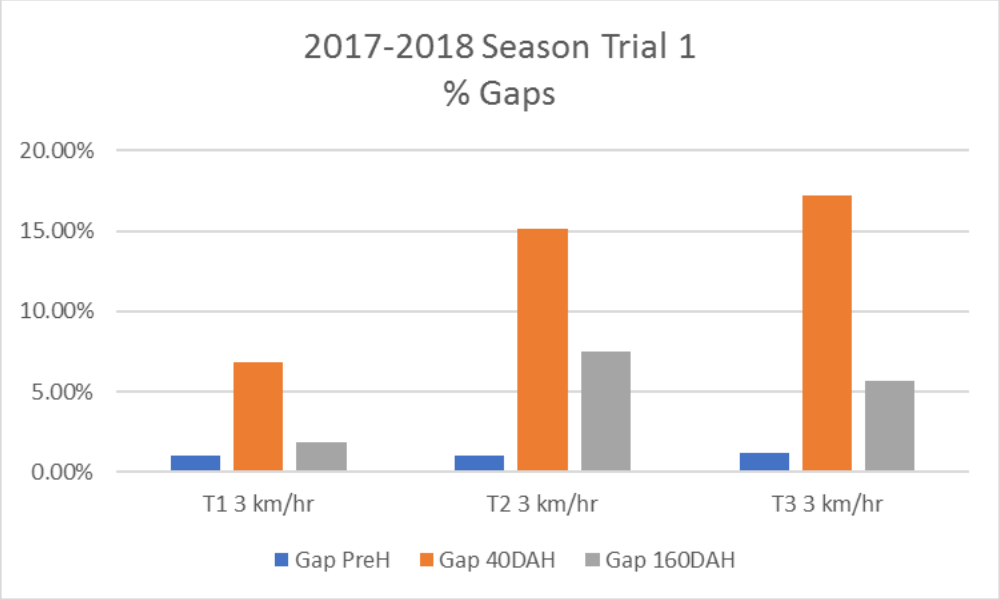

Figure 2 - Results from first year of harvest; Site 1

Due to misinformation at the time of harvest, this trial (Site 1) was all harvested at 3km/hr.

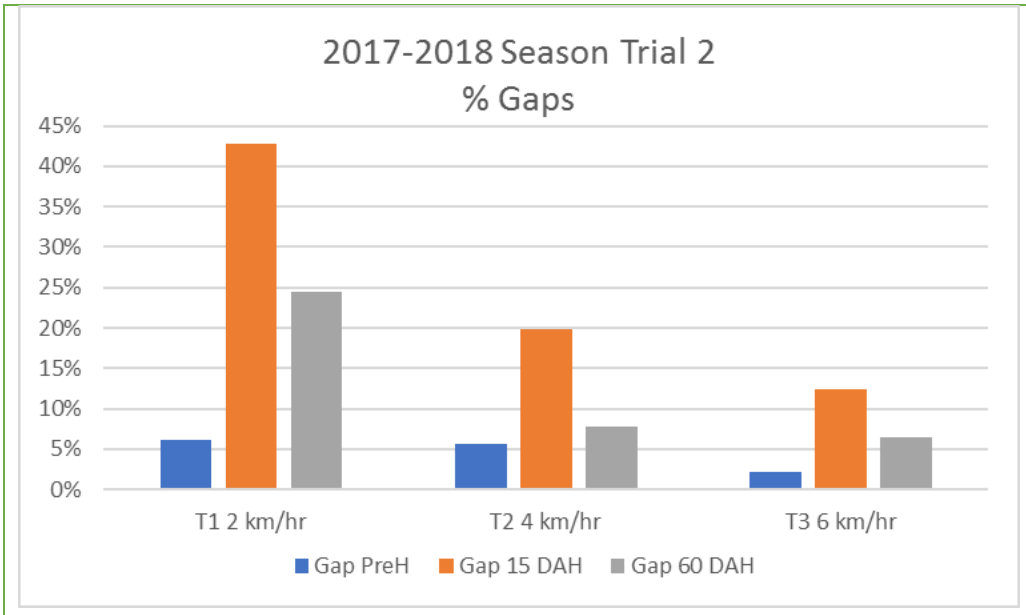

Figure 3 - Results from first year of harvest: Site 2.

2018 Harvest Results

Results from the 2018 season were not as clear as the 2017 season, with gaps sometimes increasing and sometimes decreasing (Figures 4 and 5). In Trial 3 gaps increased going at the slowest speed, likely due to an inability to create a clean cut and damaging the stool. Trial 4 showed a similar trend, however at both 2 km/hr and 4 km/hr speeds.

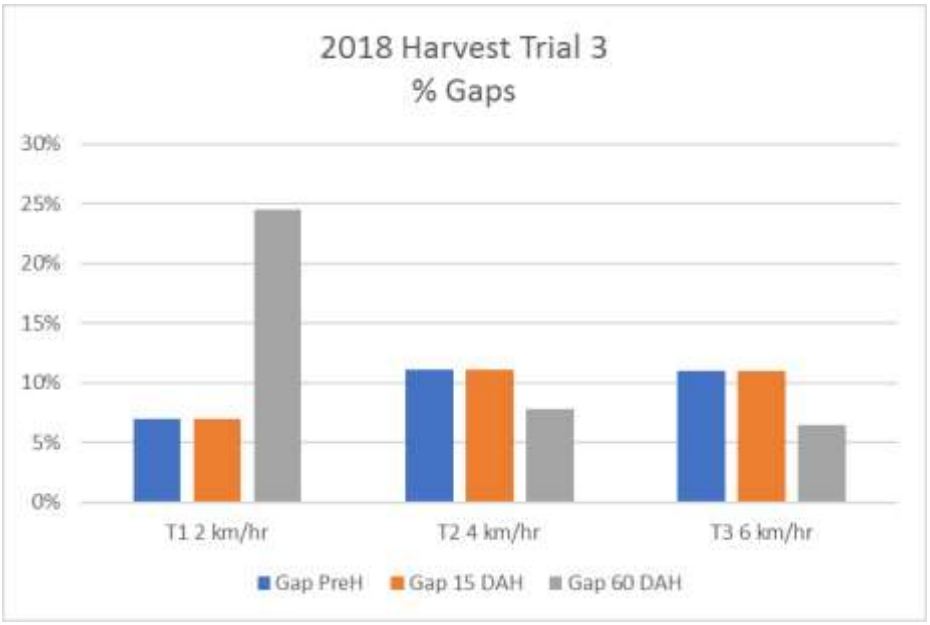

Figure 4 - Results from second year of trial: Site 3

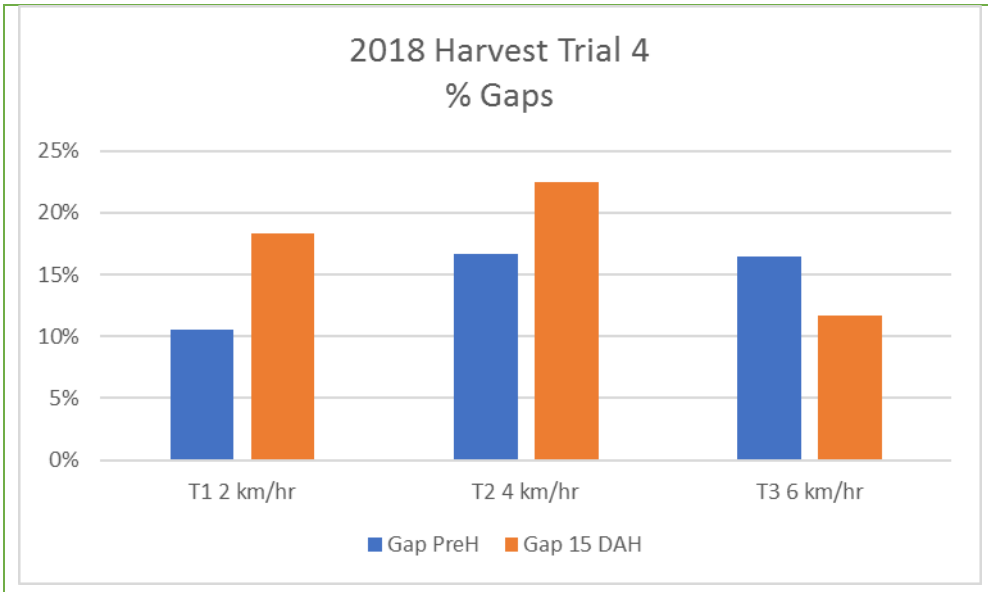

Figure 5 - Results from second year of harvest: Site 4

Generally there are more gaps in a sugarcane crop after harvest. The big question is how to reduce number of gaps. Harvester speed is only one of the factors that contribute to cane gaps (variety, soil type, crop presentation, weather at harvest, pest damage, row spacing)

Several crop monitors are able to detect 0.5m cane gap, if conducted in the earlier stages after harvest.

Variable applicators have been used to apply nutrients in response to leaf detection, however for a successful outcome nutrient application timing and crop stage need to be carefully considered.

Subsequent to this trial, further testing of sensor evaluation of gap analysis linked to fertiliser application was conducted at another farm location in the Mackay region. Early indications of results have indicated that no yield loss occurred when comparing fertiliser application of cane only (where o fertiliser was applied to gaps) versus fertilising all (gaps included).

Conclusions and comments

Harvester speeds are determined by a number of factors including, variety, lodging, soil moisture, paddock landscape and cane size. Ideal speed may differ for each of these situations as there are many variables to consider. This trial has shown that travelling at too low of a speed can contribute to increased number of gaps, so it may not always be the most appropriate option.

Advantages of this Practice Change:
Increased economics of harvesting at ideal rates and preserving the health of future ratoon crops.

Disadvantages of this Practice Change:
Potentially make harvesting process slower, requiring more time to be spent in the paddock by the harvesting group.

Will you be using this practice in the future:
Results from this trial were unclear. More trial work would be required to take up the practice.

% of farm you would be confident to use this practice:
Where crops are large and/or lodged and slowing down would be appropriate.

Site is complete