

Project Catalyst Trial Report

Using a Smart Phone App to Record Irrigations

Grower Information

Grower Name:	Christian Lago
Entity Name:	RJ Lago Enterprises
Trial Farm No/Name:	BKN-06373A
Mill Area:	Pioneer
Total Farm Area ha:	394
No. Years Farming:	
Trial Subdistrict:	Pioneer
Area under Cane ha:	394

Trial Status

- Completed.

Background Information

Aim: to assist Burdekin growers in recording their irrigation data

Background: (Rationale for why this might work)

At the moment, there are very few Burdekin growers who record their irrigations and know how much water they're using on farm (ML/ha). As a result, there's no hard data concerning what is an appropriate volume of water to apply to sugarcane over the season.

One of the reasons grower's (especially in the Delta) do not keep irrigation records is that their pumps are not metered. This makes calculating irrigation volumes difficult unless the grower knows their pump flow rates or conducts a bucket and stopwatch to calculate the cup flow rate.

A number of growers have expressed interest in keeping irrigation records if it can be conducted with technology or with a smart phone app.

There is also potential for the end of row sensors being trialled with other growers may be able to be used to record irrigations – the sensor is able to time stamp and GPS stamp the location of each change of state (wet/dry) creating an online record of hours irrigated. If growers are aware of their pump flow rate and set areas, they will be able to calculate and record the volume of water applied.

Potential Water Quality Benefit:

By creating irrigation records, growers will be able to see how much water their applying to their paddocks over the season. This will give them the ability to decide whether or not to increase/decrease the volume of water being applied. They will also be able to identify blocks that they may be applying too much water to and be able to change their practices to reduce the volume of water being wasted or lost to runoff/deeo drainage.

Expected Outcome of Trial:

Growers will be able to install sensors at the top of their blocks or use an record keeping app to record their water use. This will inform their future water use, hopefully helping them reduce their wastage.

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Where did this idea come from: Farmacist

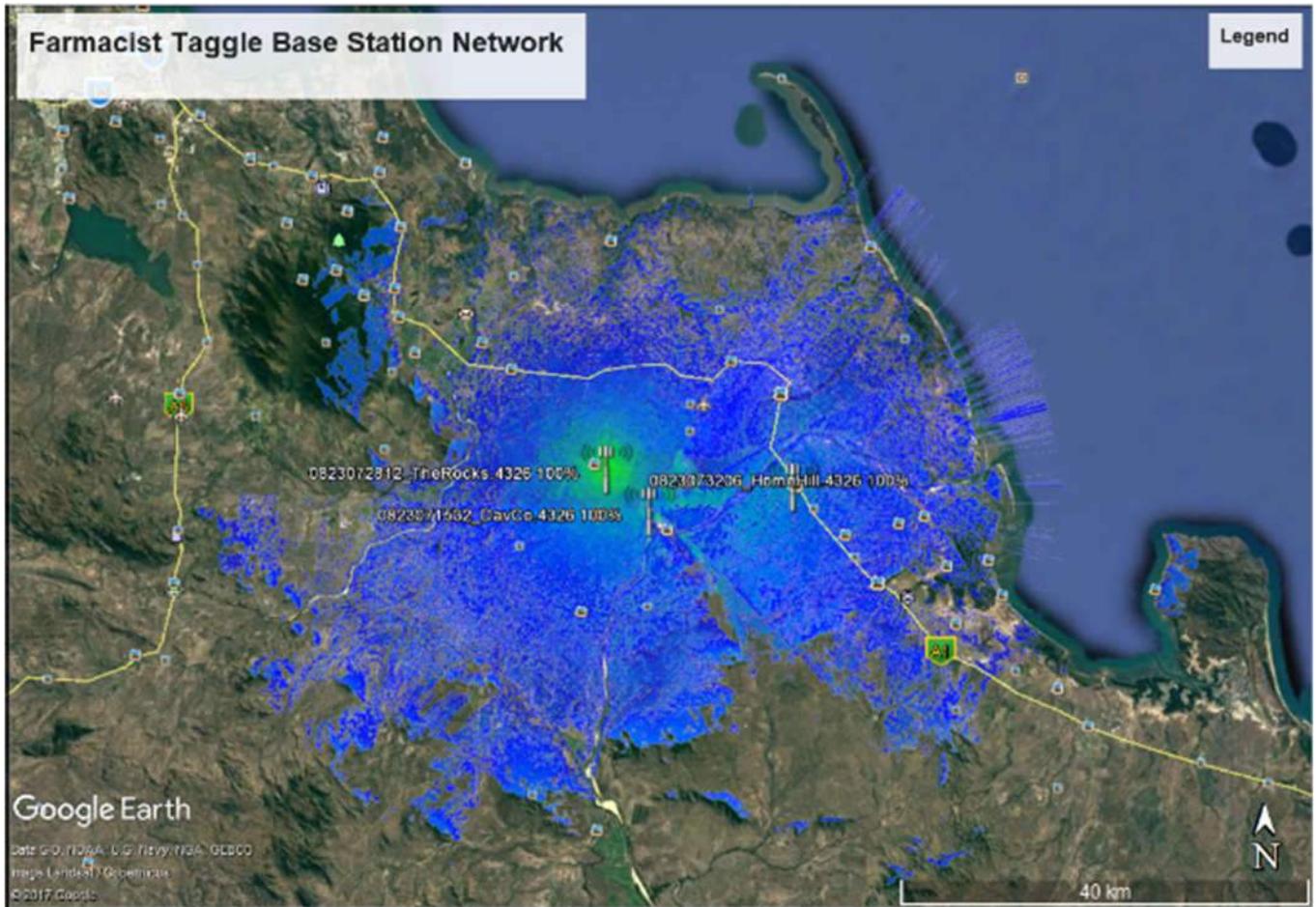
Plan - Project Activities	Date : (mth/year to be undertaken)	Activities :(breakdown of each activity for each stage)
Stage 1	Jan-July 2017	- Design an end of row sensor that will communicate with a low power radio base station network
Stage 2	July – Dec 2017	- Implement the base station network
Stage 3	Jan -Dec 2018	- Install the sensor at the top of a trial block and test the sensor for reliability and robustness. - Develop a smart phone app to assist growers in creating irrigation records.
Stage 4	2019	- Implement use and monitor success
Stage 5	2020	- Implement use and monitor success

Project Trial site details

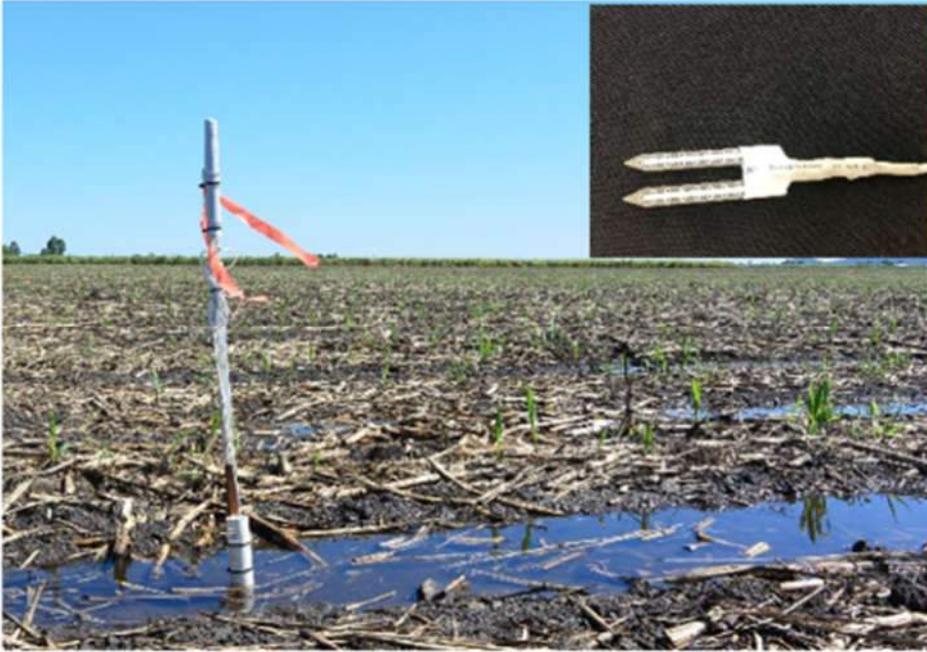
Trial Crop:	Sugarcane
Variety: Rat/Plt:	Various
Trial Block No/Name:	Various
Trial Block Size Ha:	Various
Trial Block Position (GPS):	Various
Soil Type:	Various

Block History, Trial Design:

Once the base station network was set up, the coverage is expected to be similar to the image below:



The sensor being used is pictured below:



A sensor has been installed at the top of the block to record irrigations:



Treatments:

TRT 1 – using sensors to record irrigations

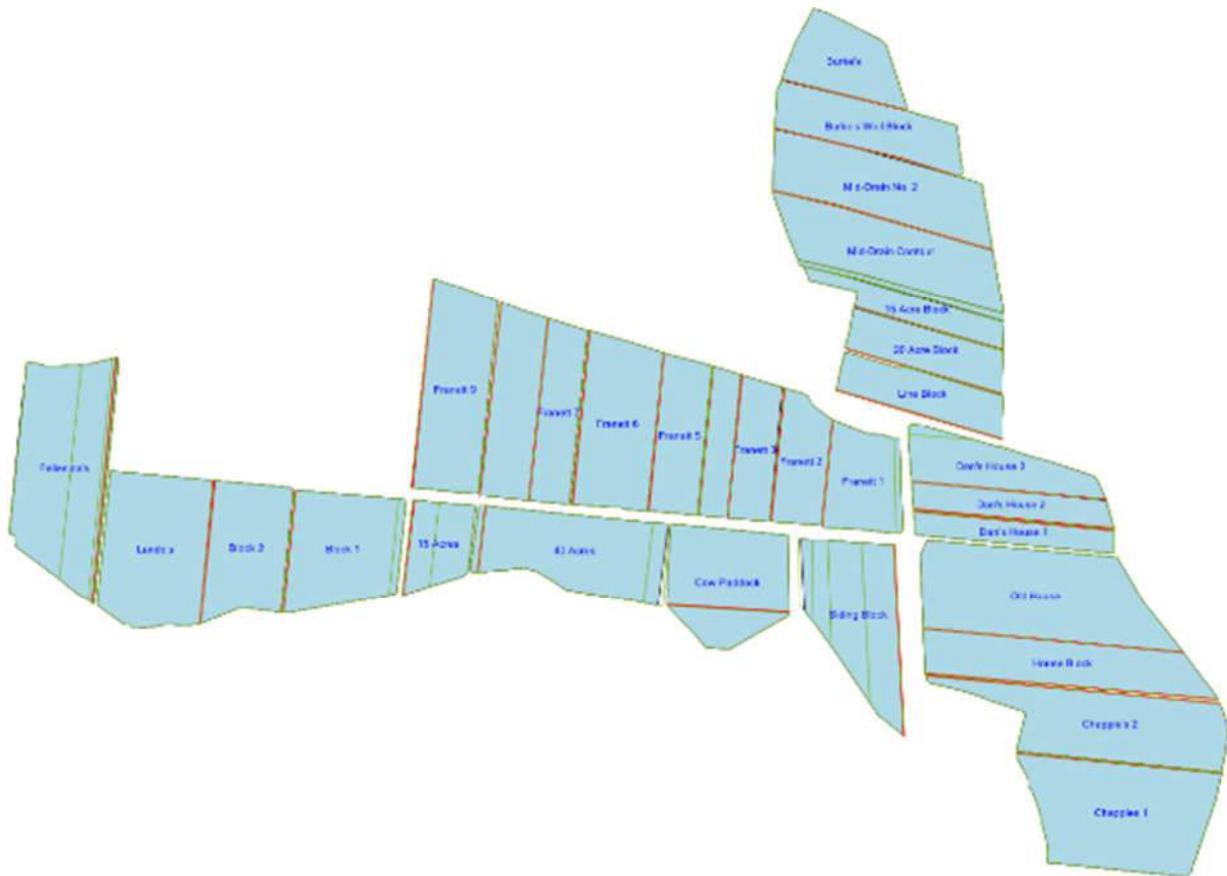
TRT 2 – using the irrigation record app to record irrigations

Results:

The sensors were shown to be too unreliable to accurately record irrigations for growers. This is primarily due to the locality of the farm and the reach of the base stations.

Over the last 12 months, Farmacist has been developing a smart phone app that will allow growers to record their irrigations quickly and easily. The app records data such as start/stop dates and times and volume of water applied (ML and ML/ha). To calculate volume, the app uses either their meter readings (if they have meters) or their pump/cup flow rates. When using the pump/cup flow rates, the app acts as a bucket and stopwatch – it uses the flowrates (input by the agronomist/grower) and the set area to calculate the volume applied. All of this data is also spatially allocated to each set and each block.

The grower has been a test grower during this process and has taken to the app very quickly. He has described how simple the app is to use and has recorded a number of irrigations since January 2019. Initially, the grower trialed the app on a small section of the farm; however, he quickly got the rest of the farm set up so he could record irrigations over his whole farming area. Below is an image of the grower's irrigation management zones as they are set up in the app.



In order to get more accurate data, the pump and cup flow rates need to be calibrated for each set. The grower was part of the process in calibrating the first section of the farm (images below). The grower then felt confident enough to work out the cup flow rates for the rest of the farm on his own.



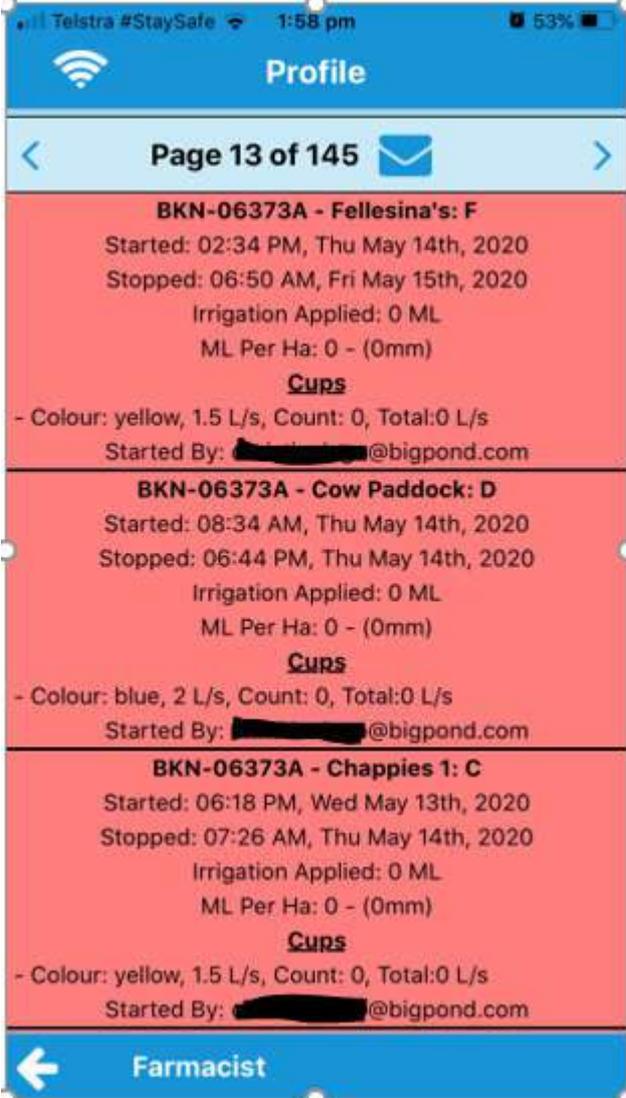


The grower and his farm workers have been in putting irrigation record data into the app over a 12 month period. The app has been expanded to include another 2 of his farms. The next step for the grower and the app is to develop some reports so the grower can view his irrigation data collated and on a per season basis.

UPDATE 12/6/2020

The grower has had some trouble with getting the app to calculate irrigation volumes for him due to a bug in the app which isn't picking up the number of cups in a set to calculate the flow rate (the grower uses cup flow rates instead of pump flow rates to calculate irrigation volumes). This error has been fixed. The grower has nearly 1500 irrigation records in the app which is a testament to the ease of the app – now Farmacist needs to fix the irrigation records that were not calculated properly and report back to the grower with his water use data.

Below are some screen shots from the grower's Irrigation Record App account:



Update 4/3/2021

As of the 4/3/2021, the grower has over 2000 irrigation records! This is a fantastic and commendable effort on the part of Christian and his farm workers. Since the flow rate error has been fixed, the irrigation volumes are all being calculated appropriately. Farmacist has been working on developing an irrigation record report for growers. An example of this data is shown below:

Imz Name	Set Name	Start Date	Start Time	End Date	End Time	Pumping Hours	Start Row	End Row	Total Rows	Area	Application Rate (ML/ha)	Depth Applied (mm)	Irrigation Applied (ML)
Catalano's 2		08/04/20		08-04-20	11:59:PM	17.98	1	38	38	4.47	0	0	0
		02/06/20		02-06-20	04:21:AM	0.08	1	38	38	4.47	0.00	0.41	0.02
		09/11/20		09-11-20	09:30:PM	17.12	1	38	38	4.47	0.79	78.57	3.51
		19/11/20		19-11-20	10:43:PM	21.78	1	38	38	4.47	1.00	100.02	4.47
		03/12/20		03-12-20	09:04:PM	17.35	1	38	38	4.47	0.80	79.59	3.56
		04/12/20		04-12-20	11:50:PM	20.33	1	38	38	4.47	0.93	93.27	4.17
		15/12/20		15-12-20	09:14:PM	17.9	1	38	38	4.47	0.82	82.20	3.68
B		09/04/20		09-04-20	09:32:PM	17.35	39	75	37	4.24	0	0	0
		14/05/20		14-05-20	08:50:PM	16.25	39	75	37	4.24	0	0	0

The data in the reports also has a summary row that shows the total ML applied to the block, and the ML/ha and depth applied (mm) applied to the block. This data can be used to identify blocks that may be consuming higher volumes of water than others, benchmark paddocks according to yield compared to water use (tC/ML) and assess the overall efficiency of the grower's irrigation practices. The reporting function of the irrigation record app is still in developing but will definitely be a useful piece of information for growers when it is ready for distribution.

Conclusions and comments

Ideally, growers would be able to passively record their irrigations, due to the sheer number of irrigations that are applied throughout the season. This was what we were trialling by putting the sensors at the top of the block; however, these have been found to be too unreliable to accurately record the irrigation start and stop times.

If growers are to actively record irrigations, the process should be quick and easy – if they have to input too much information, they are unlikely to continue to record their irrigations, especially in peak irrigation times. This is where the Farmacist irrigation app has come into play – from reports from growers, once the app is set up (this takes the most time), actually using the app is a quick and easy process. As the grower only needs to press start and stop to create his irrigation record, he has been using it regularly.

Advantages of this Practice Change:

By recording irrigations, growers are able to get a better understanding of their water use. This helps them identify where they may be applying too much water, or not enough relative to their soil's water holding capacity and the crop yield. By identifying areas where they may be applying too much water, the grower can take steps to reduce this water use or mitigate the issues – by applying appropriate volumes of water, the grower reduces their risk of losses. Water is the primary loss pathway for nutrient and pesticides to leave the paddock (run off or deep drainage).

Disadvantages of this Practice Change:

There are little to no disadvantages to recording irrigations; however, there are disadvantages to the different irrigation record methods.

With the sensors, the advantages to that system is the passive recording – this ensures that the records do not rely on grower's memories. However, this only works if the sensors are working everytime.

With the irrigation record app, the advantages are that it is quick and simple to use and the app does all the calculations for the grower. It also spatially allocates the data. The disadvantage is that it relies on the grower to remember to input the data at all times. This can be an issue when growers are in their peak irrigation period.

Will you be using this practice in the future:

The grower has implemented the app over the entire farm and has no plans to stop using the app at this stage.

% of farm you would be confident to use this practice :

The app is used on 100% of the farm.