

Catalyst Project Report – Final report

Use of telemetry for soil moisture

Grower Information

Grower Name:	Steven Muscat
Entity Name:	Tacsum Industries ATF
Trial Farm No/Name:	MKY-04740A
Mill Area:	Mackay Sugar
Total Farm Area ha:	125
No. Years Farming:	8
Trial Subdistrict:	Homebush/Oakenden
Area under Cane ha:	120

Background Information

Aim:

The aim of telemetry is to use sensors to detect changes in soil moisture and in turn automatically inform the grower when adequate soil moisture is achieved or when irrigation must be applied. Following on, automation could assist in turning the irrigator on or off in accordance to the soil moisture readings.

Background:

Irrigation is commonly used in Mackay/Whitsundays, however the use of automation and telemetry to control flow and water usage is not widely practiced due to the limitations of current telemetry units. While automation and telemetry have been widely used with low pressure irrigation systems, its use is generally not considered by growers with other irrigation delivery systems.

Using a soil moisture probe allows the grower a better understanding of soil responses to irrigation, as well as the time taken by the plant to use that soil moisture. With the use of telemetry, the grower will have instant access to this information and can make informed decisions about irrigation application amounts and frequency.

Currently the low-cost telemetry systems available have shown issues with reliability in regard to data transfer. As a part of this project, development of hardware and software will occur to try and improve this issue, whilst still keeping the costs low.

Potential Water Quality Benefit:

More efficient watering system will limit the amount of runoff caused by irrigation events and prevent over-watering, as well as improving yields by ensuring paddocks are irrigated as required.

Expected Outcome of Trial:

Decrease run off, and provide a cost saving by more efficient irrigation methods

Service provider contact: Farmacist

Where did this idea come from: Farmacist /Grower

Plan - Project Activities	Date: (mth/year to be undertaken)	Activities : (breakdown of each activity for each stage)
Stage 1	2016	Assess current available systems in regard to how they work and any hindrances.
Stage 2	2017	Develop hardware and software to improve commercial viability of telemetry systems
Stage 3	Post-Harvest 2017	Once cane is harvested, set up sensors and telemetry system in suitable paddock/s.
Stage 4	Growing season 2017-2018	Assess system, make any necessary adjustments or improvements and monitor crop response.
Stage 5	August 2018	Re-position hardware in soil and modify irrigation app

Project Trial site details

Trial Crop:	Sugar Cane
Variety: Rat/Plt:	Mixed
Trial Block No/Name:	Multiple
Trial Block Size Ha:	
Trial Block Position (GPS):	
Soil Type:	Duplex

Block History, Trial Design:

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Results:

A prototype low cost soil moisture sensor has been developed by Farmacist staff (Figure 1). The Progress of the final design and subsequent commercial production of the sensor has been delayed due to technology issues associated with battery life and communication requirements. These issues have mostly been resolved and it is expected that a commercial product will be developed by Mid-2018. A design and costing of the associated monitoring app has been approved and work has commenced on the development.



Figure 1 - prototype soil moisture sensor

Prototype sensors have been completed and are being trialled in paddock situations. The app is in test phase and the sensor information is successfully communicating to the app with information viewable by the user. The images below (Figures 2 and 3) are screen shots of the app showing information that has automatically come in from a number of sensors.

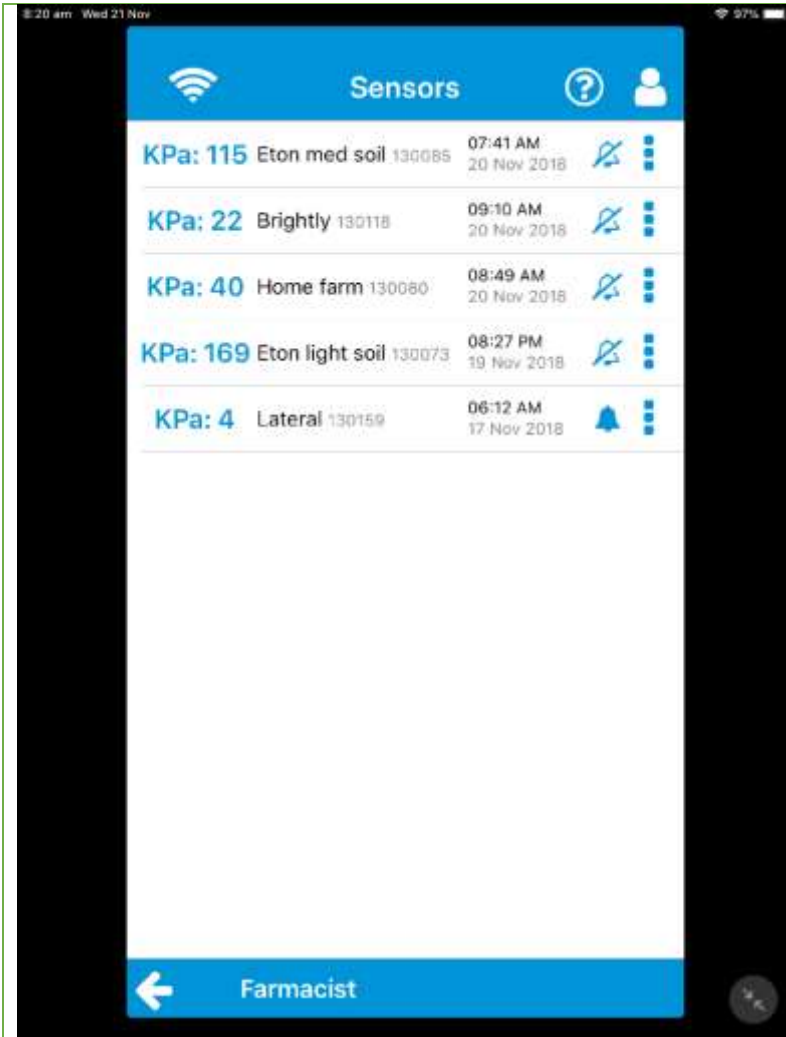


Figure 2 - soil moisture sensor app - overview screen

Figure 2 is an overview screen on the app showing all sensors and their current status.

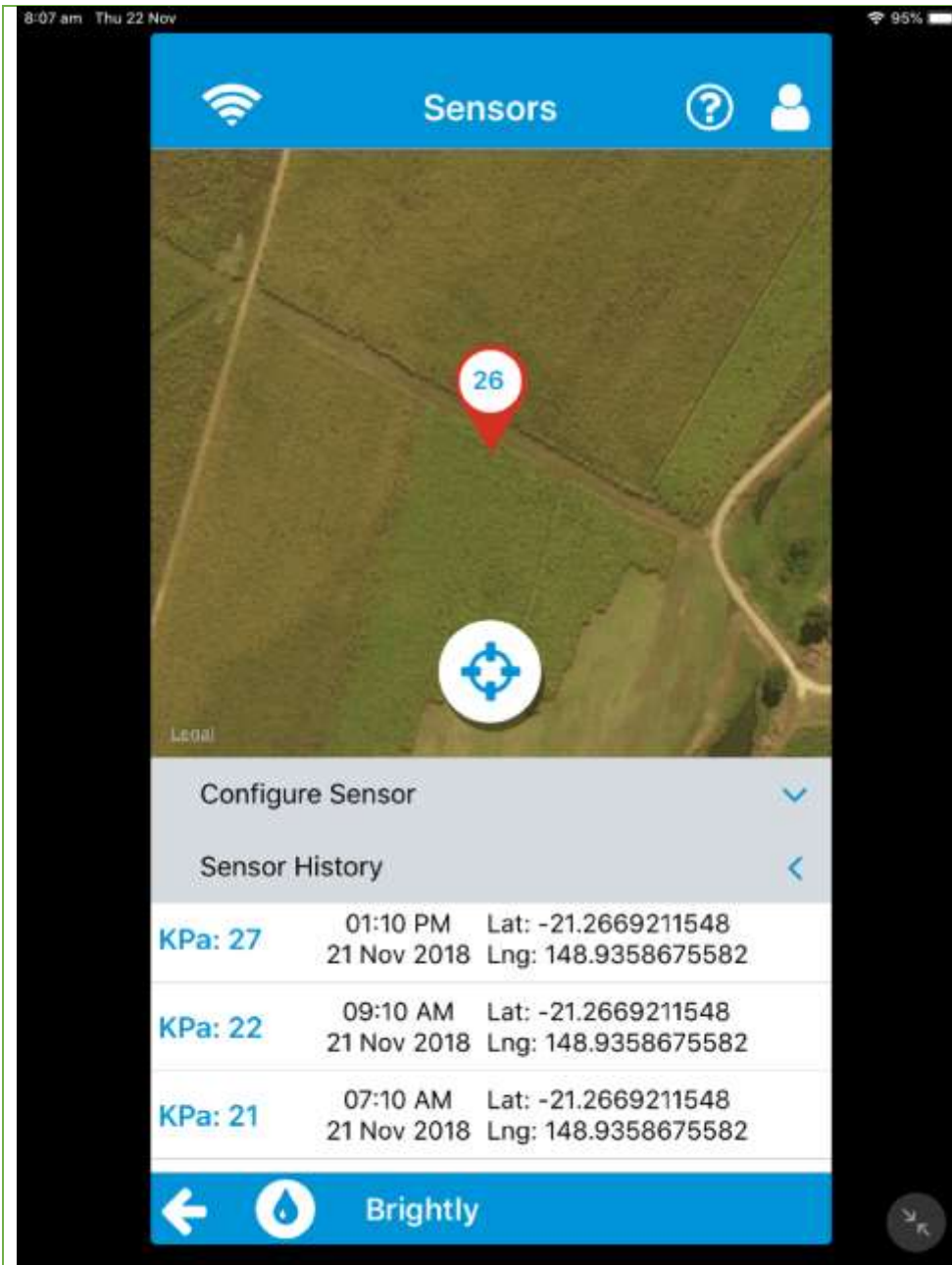


Figure 3 - soil moisture sensor app - sensor history screen

Figure 3 shows the specific information of a single sensor. From this screen the name and location can be edited, and the history of the sensor viewed.

Further work is to be completed on the sensors to ensure they are robust enough to withstand on-farm conditions and ensure any faults are resolved, however at this stage the sensors are working and providing the required information as can be seen in Figure 4 below.

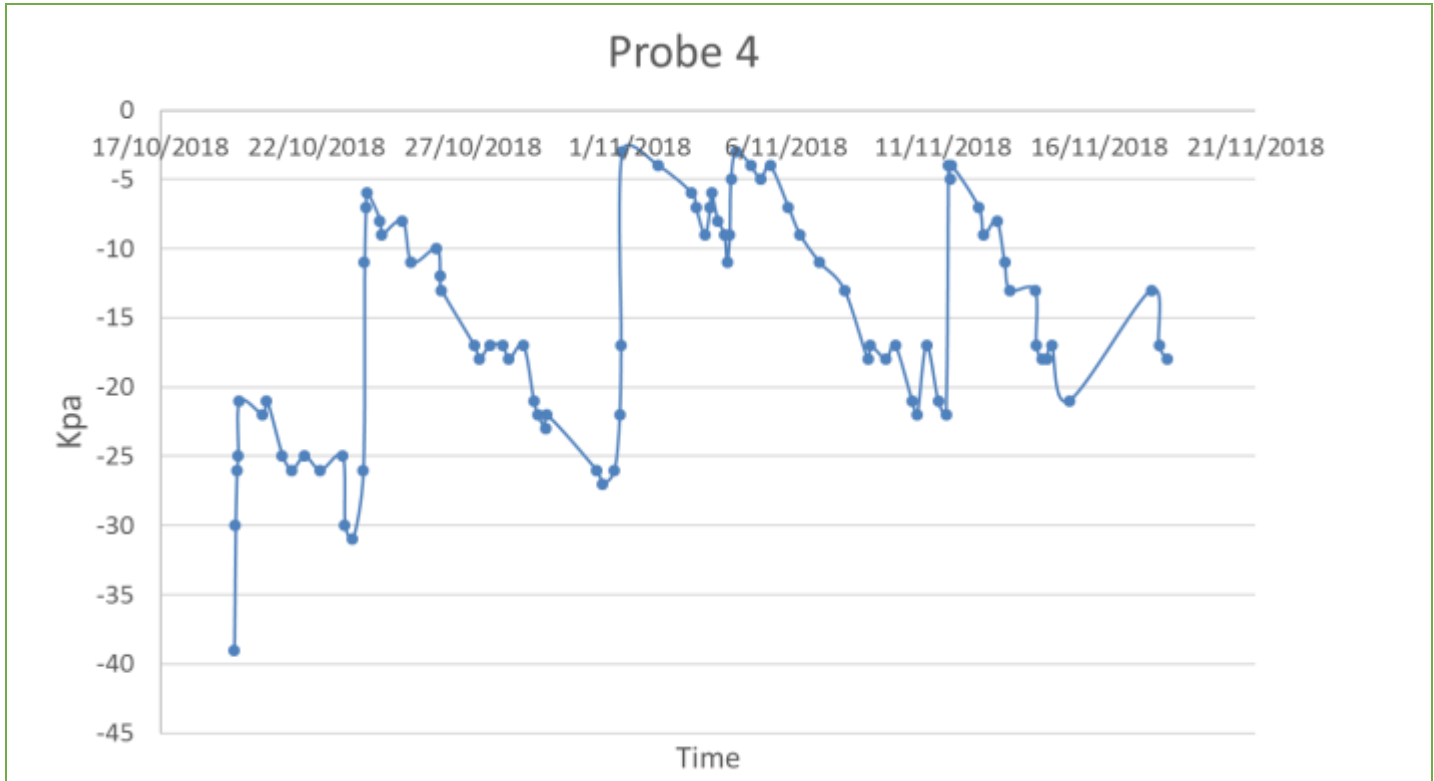


Figure 4 - Plot of changes in soil moisture over time

Figure 4 shows the change in soil moisture over the course of a month in the paddock. The kpa values is a measure of resistance and is indicating the amount of force the roots would be exerting to utilise the soil water; the closer to zero, the wetter the soil, as the soil dries out the kpa values increase indicating the plant root system has to work harder to extract moisture from the soil.

Conclusions and comments

Promising progress has been made on the development of the app and sensors in the past few months. The sensors are going to be a cost effective way to utilise telemetry technology across a farmers property and can easily be integrated into their irrigation decision making progress.

Advantages of this Practice Change:

More efficient irrigation, minimising over- or under- irrigation, increasing yields and profitability.

Disadvantages of this Practice Change:

Will you be using this practice in the future:

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

This project is now complete. The project outcomes have been incorporated into a new project for Tacsum (Ripped versus Not ripped) which includes soil moisture assessment as part of the project assessment.