Project Catalyst

Case study

Paul Villis and Jason Crichton evaluate the benefits of recording irrigation data

Grower Name: Paul Villis and Jason Crichton

Entity Name: Jurgens Cane Farming

Mill Area: Kalamia

Total Farm Area: 384ha

Area under Cane: 384ha

No. Years Farming: 21

Trial Subdistrict: Burstalls

Jason Crichton and Paul Villis

Sugarcane grown in the Burdekin region is under a fully irrigated system. Approximately 95% of sugarcane grown in the Burdekin is irrigated through furrow irrigation. Though water is an essential element of the Burdekin growing system, there is only a small number of growers who are actively measuring and recording their irrigation data. This can be a difficult exercise for a number of reasons. Growers tend to have multiple irrigation sets per block, and the number of cups in each of these sets can change depending on the time of year, crop stage and height of the water table. Furthermore, the growers with access to a channel system have meters on those gates or bores to monitor the volume of channel water being used; however, many growers use underground bores to irrigate their crops and these are usually unmetered. Lastly, depending on the number of blocks and sets that a grower has, recording irrigation data can lead to a huge number of entries, which can be difficult to manage and develop into usable data.

So, why bother recording irrigation data? In an environment where power and water prices are on the rise, collecting irrigation records can be hugely beneficial to growers. Collecting irrigation records allows growers to develop a baseline water use for their crops and blocks by comparing the megalitres of water applied to the blocks (ML/ha per irrigation or over the season) and comparing water applied to cane yields (ML per tonnes of cane). By calculating water use values over a season, growers can identify areas of the farm that are performing more or less efficiently and investigate the differences between these areas. For example, there could be different soil types, irrigation water quality, varieties and/or crop age. Growers can also compare water use to their power bills and identify which blocks are costing more to irrigate and work to improve the conditions of that block. Comparing yield to volume of water applied allows growers a new way to analyse their farm and make more informed decisions concerning elements such as crop rotation and fallow paddock management. The volume of water applied per irrigation can vary throughout the year, and by monitoring the variation in volume, growers are able to see where they may be applying more or less water than required and adjust their irrigation practices to suit. Per irrigation volumes are also useful in identifying paddock issues such as deep drainage and issues with soakage. Growers can compare irrigation volume data and crop water use to assess irrigation application efficiency.

To help growers collect irrigation data, Farmacist has been developing an irrigation record module as part of the Farmacist smart phone app. The app is designed to spatially calculate the area of each set (to account for odd shaped blocks) and calculate the volume of water applied using either the pump flow rates or calibrated cup flow rates. Once the grower's farm has been entered into the app (including blocks, sets and pump/cup flow rates), the grower only has to select the block, select the set, select which pump/cup colour they're using, and then press START! Once the irrigation is finished, the grower can press STOP on the record. Then, the app will then calculate (and record) the set area, the total megalitres applied and the volume applied in both ML/ha and mm. It's as easy as start and stop.

Jason Crichton and Paul Villis have been using the irrigation record app to record irrigation data on two of the farms that they manage in the Airdmillan region of the Burdekin. Jason has been using the app

What it's about

Project Catalyst is a grower-led innovation project in sugar cane that was formed to explore and validate farm management practice change leading to improved water quality for the Great Barrier Reef. For more information on Project Catalyst please visit our website https://www.projectcatalyst.net.au/ or phone Catchment Solutions on 07 4968 4216.

since February 2019 and his feedback has been positive. The app has been easy to use and allowed him to collect 479 irrigation records with a few taps of his phone screen. More development of the app is required to collate the data into reports that present block and farm summaries; however, as a method of monitoring irrigation volumes over the season it's been very useful. Jason also uses the app to check how long it's been since a block or set was last irrigated. Once the app is further developed, Jason and Paul will be able to view the cumulative volume of water applied to each block and receive irrigation record reports which will provide each irrigation entry, set, block and farm summaries.

A good example of how irrigation record data can be used to estimate irrigation efficiencies is by comparing application volumes to crop water use. To use some data collected by Jason, there was 12 days between the irrigations on the 27/10/2019 and the 8/11/2019. The average evapotranspiration rate for November is 6mm/day, which equates to a total evapotranspiration amount of 72mm over 12 days. At this stage, the sugarcane canopy was likely 100% closed and actively growing – this requires a crop factor (Kc) of 1.2, making the crop water use value 86.4mm. On the 8/11/2019 106.3mm of irrigation water was applied. This equates to an approximate irrigation application efficiency of 81.3%. This calculation does not take in losses such as run off or deep drainage losses; however, as a quick efficiency calculation it's quite useful.

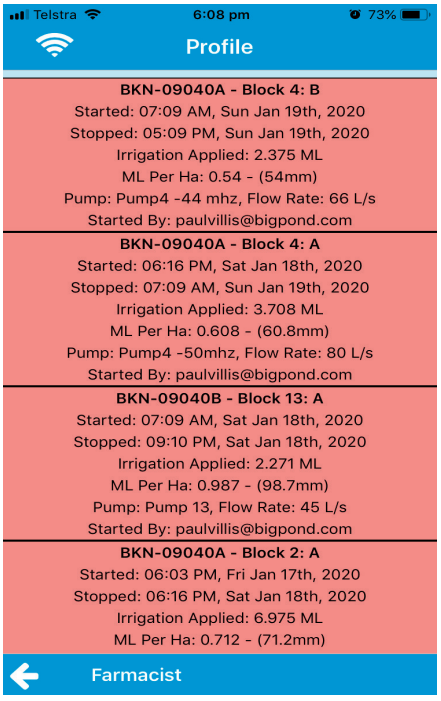
Collecting consistent irrigation records can be a difficult process and can require a bit of creativity at times to develop a simple to use system that can provide accurate data to the grower. With the support of growers such as Jason and Paul, in consistently using the irrigation record app, we're well on our way to being able to get a better understanding of water use and it's impact on yield in the Burdekin region.

Block 5		Set A			
Start		Stop		ML/ha	mm
6:01 am	14/4/19	6:02 am	14/4/19	0.606	60.6
5:19 pm	6/5/19	6:47 am	7/5/19	0.679	67.9
6:21 am	29/5/19	6:25 pm	29/5/19	0.608	60.8
6:46 am	24/6/19	6:21 pm	24/6/19	0.584	58.4
7:25 am	10/8/19	7:07 pm	11/8/19	1.194	119.4
6:19 pm	10/9/19	6:27 am	11/9/19	0.612	61.2
6:46 pm	29/10/19	6:52 am	30/9/19	0.61	61

Table 1 - Example of Ratoon Cane Data

Block 5		Set A			
Start		Stop		ML/ha	mm
6:26 am	29/5/19	7:43 am	30/5/19	1.321	132.1
8:50 am	2/7/19	7:03 am	3/7/19	2.212	221.2
5:13 pm	7/8/19	2:35 pm	8/8/19	2.126	212.6
7:38 am	6/9/19	8:33 am	7/9/19	2.48	248
12:22 pm	29/9/19	2:52 am	30/9/19	1.442	144.2
6:56 am	14/10/19	6:21 pm	14/10/19	1.136	113.6
6:38 pm	27/10/19	7:32 am	28/10/19	1.284	128.4
6:46 am	8/11/19	5:27 pm	8/11/19	1.063	106.3
6:44 am	29/11/19	5:29 pm	29/11/19	1.071	107.1
6:08 pm	6/12/19	6:51 am	7/12/19	1.178	117.8
7:37 am	24/12/19	6:43 pm	24/12/19	1.105	110.5
7:02 am	31/12/19	4:59 pm	31/12/19	0.99	99
6:54 am	7/1/20	9:39 pm	7/1/20	1.468	146.8
6:16 pm	13/1/20	6:47 am	14/1/20	1.246	124.6

Table 2 - Example of Plant Cane Data



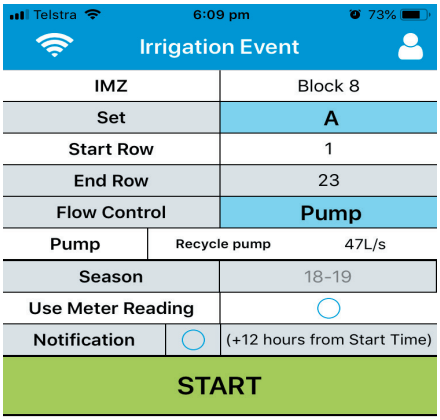


Figure 1- Data collected on smart phone app

Australian Government

REEF TRUST

Great Barrier Reef Foundation

PROJECT CATALYST

https://www.projectcatalyst.net.au/