

Project Catalyst Final Report

Calibrating GDotS to Crop Growth

Grower Information

Grower Name:	Richard Kelly
Entity Name:	LAWRENCE KELLY FAMILY TRUST
Trial Farm No/Name:	BKN-07333A
Mill Area:	Kalamia
Total Farm Area ha:	97.44ha
No. Years Farming:	
Trial Subdistrict:	Maidavale
Area under Cane ha:	97.44ha

Trial Status

- Finished

Background Information

Aim: To calibrate GDots to sugarcane growth to give growers more confidence to use them for irrigations scheduling. To encourage the adoption of GDots as an irrigation scheduling tool.

Background: (Rationale for why this might work)

GDots are a new irrigation management tool to the Burdekin. A GDot is a gypsum block that is buried in the root zone of the crop with a cord that leads to a head unit. The head unit has 7 yellow dots that drop off as the soil dries out. That is, at $<10\text{kPa}$, the GDot has 7 dots. The dots flick to black as the soil dries, so when the soil tension is $>100\text{kPa}$, there are no dots on the GDot.

The GDots do not read soil moisture, they are a measurement of soil tension. This is an indication of how much energy the plant is having to use to extract water from the soil.

Because these tools are new to sugarcane, there has been some confusion about when to irrigate according to the GDots. To calibrate the GDots to sugarcane growth, Farmacist staff use the same method that was developed to calibrate the mini pans to sugarcane. Developed by Evan Shannon and JR Holden, this process involves selecting 25 representative sticks and measuring the daily growth over two irrigations. When the daily growth drops below 50% of the maximum daily growth (i.e. Peak growth was 40mm/day, if growth drops below 20mm/day for 2 days), it is time to irrigate that paddock.

Potential Water Quality Benefit:

Irrigation scheduling tools help growers apply their water when the crop needs it, rather than according to a set schedule. This helps to reduce unnecessary irrigations and improve productivity. Irrigation water is the primary pathway for nutrient and pesticide losses from paddocks, so irrigating according to crop requirement will help growers reduce their losses. Additionally, applying water when the crop will reduce the risk of waterlogging or drying out, improving the crops ability to maintain peak performance.

Expected Outcome of Trial:

By calibrating the GDots to crop growth, growers will have more confidence to use the tool as part of their irrigation management strategies. This in turn will reduce the number of unnecessary irrigations applied reducing the risk of nutrient and pesticide losses.

Service provider contact: Billie White (0409 477 359, billiew@farmacist.com.au)

Where did this idea come from:

<u>Plan - Project Activities</u>	Date : (mth/year to be undertaken)	Activities : (breakdown of each activity for each stage)
Stage 1		Install and calibrate the GDot Analyse the data - Share with the grower
Stage 2		- Reinstall the GDot for the grower - Work with the grower to maintain it's use on farm -
Stage 3		-
Stage 4		
Stage 5		
Stage 6		

Project Trial site details

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

Block History, Trial Design:

Block History:

Trial Design:

Methodology:

1. Install GDot in a block of hilled up plant cane. This is done by drilling a 25mm hole into the root zone of the plant, approximately 300mm deep. The gypsum block is pushed down to the bottom of the hole and a mud slurry is used to back fill the hole. The cord that is attached to the gypsum block is run back to the headland (usually top of the block) and attached to the head unit.
2. Select 25 representative sticks of sugarcane around where the gypsum block has been installed.
3. Measure the height of all of the sticks to the top visible dewlap. This is the base line measurement. The grower can now irrigate.
4. After irrigation, measure all of the sticks every day at the same time each day. Ideally, this would be mid-morning. The measurements will be averaged to calculate the average daily growth.
5. Continue to measure the sticks until peak growth has occurred, then continue measurements until the average daily growth drops below 50% of peak growth for 2 days.
6. Collate the information (average daily growth and GDot readings in kPa) and graph for the grower.

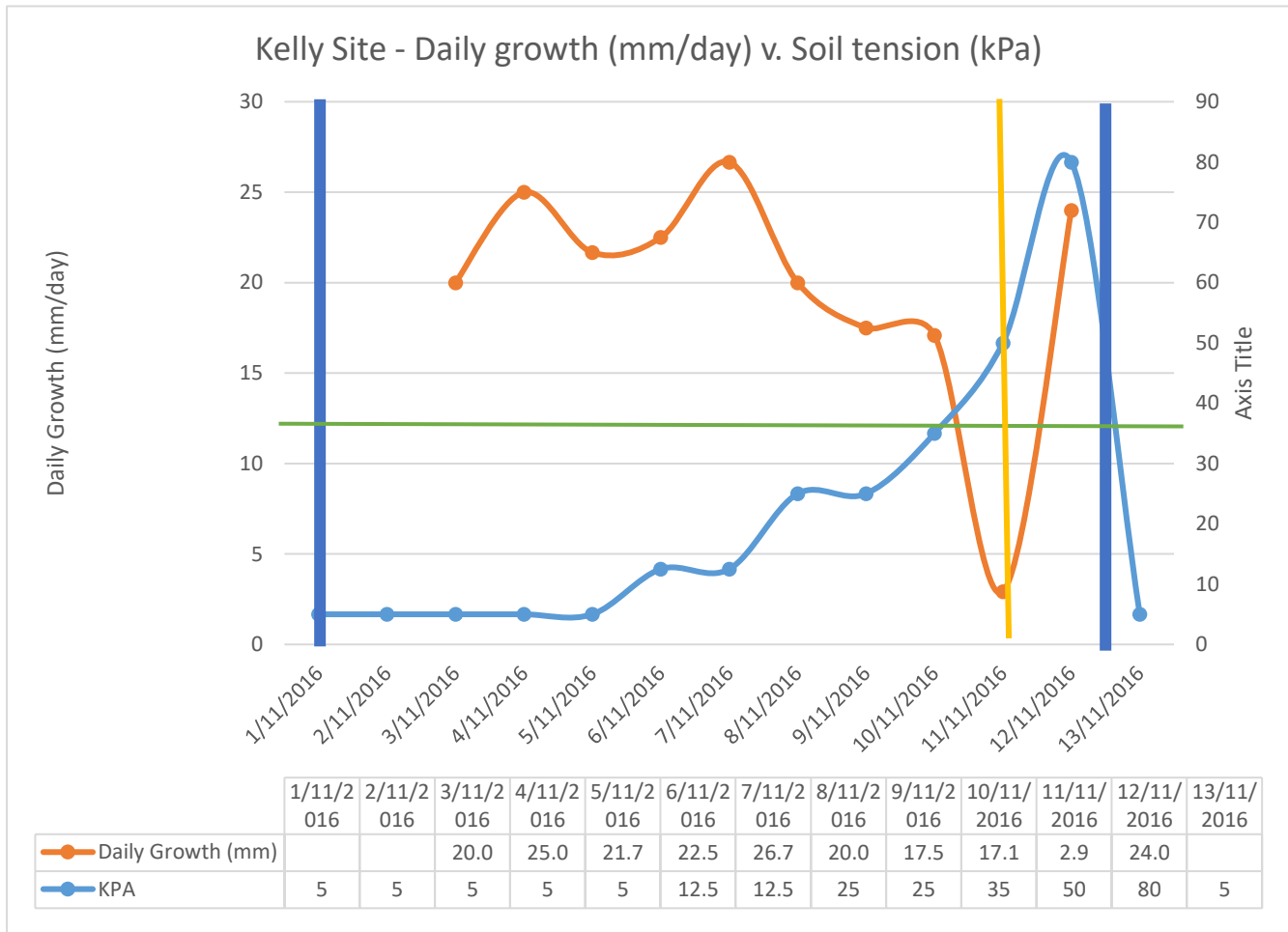
To make the graphs easier to understand, the dots on the GDots are converted to an average kPa value for that range on the GDot, instead of comparing it to the dots left on the GDot. This displays the data as the lower the number the greater the water content in the soil. The values used are below:

Dots on GDot	kPa Range	kPa Value
7	>10	5
6	10-15	12.5
5	15-20	17.5
4	20-30	25
3	30-40	23
2	40-60	50
1	60-80	80
0	> 100	105

Treatments:

Install and GDot and calibrate it to crop growth.

Results:



The calibration for this grower was conducted between the 1st and the 13th of November. Peak growth occurred on the 7th of November (26.7mm/day). **Though the daily growth did not drop below 50% of maximum growth for 2 days in a row, the growth stalled at 17mm/day before dropping dramatically to 2.9mm/day. The GDot was on 50kPa (2 dots left on the GDot) when this happened. This would suggest that irrigating when the Gdot is at 2 dots, rather than 1 dot, would help the crop maintain a high level of growth. It is unclear why the growth jumped suddenly on the last day before irrigation.**

The grower has installed his GDot on farm each year since the calibration was conducted. He finds them easy to use and maintain.

Conclusions and comments

Calibrating the GDots to crop requirement was a useful exercise to help develop the grower's confidence in the tool. **Getting the grower involved in the process helped him understand the relationship between water use and crop growth, and the readings on the GDot.**

The grower has adopted the GDots, and regularly uses them as part of his irrigation management.

Advantages of this Practice Change:

- GDots are simple and easy to use and install
- Calibrating the GDot helped built confidence
- GDots require little maintenance, so growers are more likely to use them
- Irrigating according to crop requirement will help reduce unnecessary irrigations being applied, leading to less risk of nutrient and pesticides leaving the paddock.

Disadvantages of this Practice Change:

- The gypsum blocks need to be replaced every 4-5 years

Will you be using this practice in the future:

Yes.

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

The grower has a GDot on 2 block on his farming area.