

Case Study

Proserpine Irrigation Project

IrrigWeb: An Irrigation Scheduling Tool

Case Study developed by AgriTech Solutions

Increasing yield through informed irrigation scheduling

IrrigWeb is a sugarcane crop model that can assist with irrigation scheduling, providing information about the yield potential for each sugarcane crop given the weather, soil type, growing period, and irrigation inputs.

Irrigating so that losses to runoff and deep drainage are minimised will maximise productivity, converting each megalitre Irrig applied into the maximum amount of cane and sugar.

Daily crop water use is calculated using local weather the crop received during its growing season, such as radiation, temperature, rain, humidity and temperature.

IrrigWeb also provides a potential yield based on the weather data and crop and site-specific information such as soil type, irrigation, planting and harvest date.

Information IrrigWeb can provide

Figure 1 (top chart) displays the rainfall for a 13-month-old ratoon crop harvested on 15 July 2021 and then again on 14 August 2022. An alluvial soil with plant available water (PAW) of 176mm was selected. The Up-River gauge recorded 1,345 mm of rainfall (green bars) for that growing period. The soil water deficit (SWD, red line) is a measure of how much water is required to fill the soil profile.



Figure 1. Actual water balance versus Auto-irrigate water balance

The Targeted support to maximise soil, biodiversity and vegetation outcomes in the O'Connell and Proserpine basins of the Mackay Whitsunday NRM region Project is funded by the Australian Government's Reef Trust.



When the SWD = 0 mm, the soil profile is full, and reaches field capacity. This occurred in Jan, Feb, Mar, May and Jul 2022. IrrigWeb shows the soil was very dry for a long period between 15 Jul and Jan 2022, when the wet season arrived and filled the soil profile. The severity and duration of this high SWD would have impacted on cane yield.

The bottom chart of Figure 1 shows the result of applying 3.2 ML/ha, or 8 x 40 mm irrigations (blue bars), between late July and mid-December 2022 to the same crop. IrrigWeb was used to schedule the crop using a

14-day cycle time and to irrigate when the SWD reached 80 mm. Irrigation has made the soil wetter in the period from harvest to late Dec 2022.

Determining yield impact

IrrigWeb can determine the potential yield of a sugarcane crop. For the rainfed ratoon crop growing from Jul 2021 to Aug 2022, IrrigWeb calculated a potential yield of 98 t/ha (blue line) compared to 138 t/ha (green line) from the crop irrigated with 3.2 ML/ha. An extra 40 t/ha potential yield by applying 3.2 ML/ha at the times indicated in Figure 1.

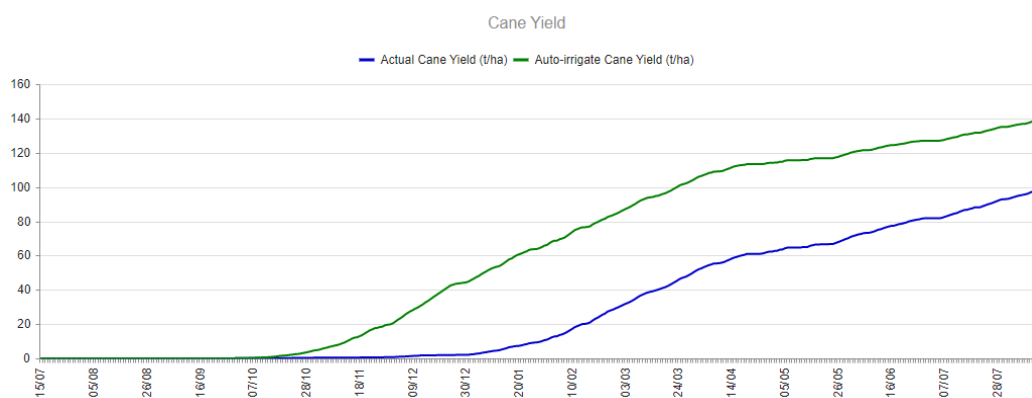


Figure 2. Based on the weather and irrigation, IrrigWeb has calculated the potential 40 t/ha yield benefit from irrigation. Potential yield for the rainfed crop was 98 t/ha while the 3.2 ML/ha generates 138 t/ha yield potential.

The 2023 Crop

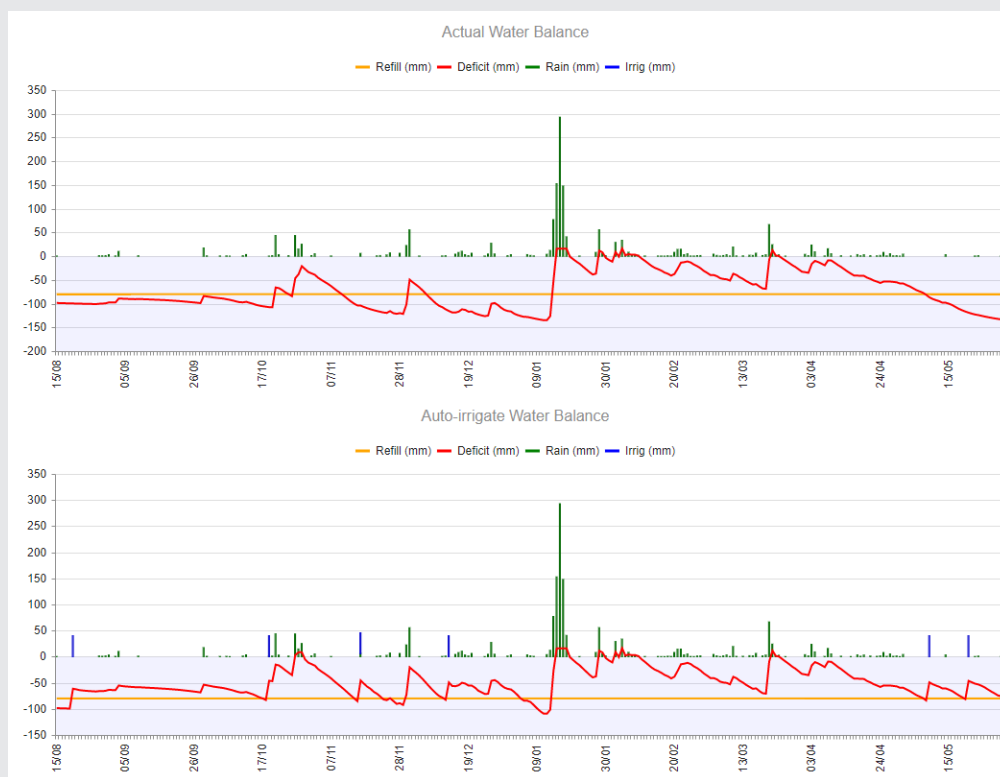


Figure 3. IrrigWeb shows that a Green Cane Trash Blanket ratoon crop growing between 15/08/2022 to 31/05/23 experienced similar dry periods up to the onset of the wet season. This prolonged dry period caused water stress and lowered the potential yield.

Figure 3 shows the following crop growing from 15 Aug 2022 to 30 May 2023 (9.5 months old). During this period 1,516 mm rain has fallen. Again, the period from harvest to onset of the wet season (mid Jan 2023) shows the rainfed crop had a large SWD (top chart). This is like the previous year. Using the same irrigation strategy as the previous year, IrrigWeb suggested 4 irrigations prior to the wet season, with another 2 in May 2023 as the profile dried after the wet season.

The 2023 Crop Yield Potential

Based on the weather, soil and a 9.5-month crop age, IrrigWeb has determined the potential yield (at 31/05/2023) for the rainfed ratoon crop is 92 t/ha (blue line) while the crop irrigated with 2.4 ML/ha (6 x 40 mm) has a potential yield of 112 t/ha. An extra 20 t/ha is predicted to be generated by the irrigation.

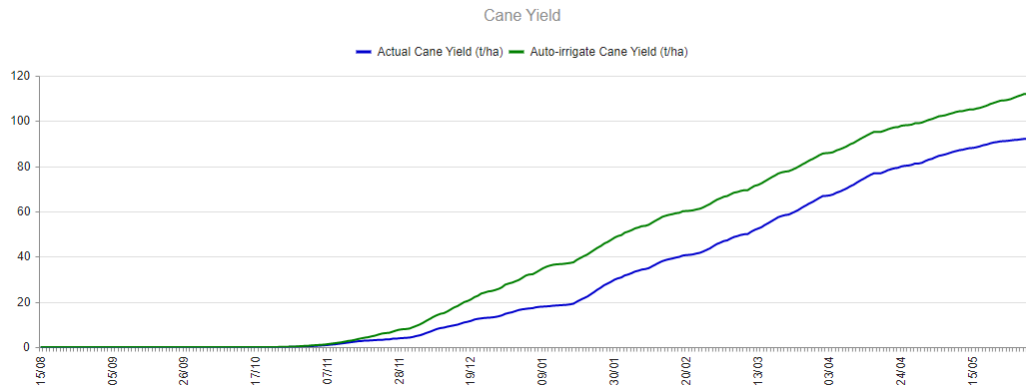


Figure 5. Based on the weather and irrigation, IrrigWeb has calculated the potential 40 t/ha yield benefit from irrigation. Potential yield for the rainfed crop was 98 t/ha while the 3.2 ML/ha generates 138 t/ha yield potential.

Increasing yield using IrrigWeb

The two examples used highlight how much additional yield is possible when irrigation is applied at critical times. IrrigWeb can schedule irrigation events so that irrigations do not occur when the soil profile is too wet or too dry.



Resources

IrrigWeb: <http://www.irrigweb.com/>



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