

PLANT GROWTH VERSUS SOIL MOISTURE, RADIATION AND EVAPOTRANSPIRATION

This factsheet provides some practical information on how to achieve improved plant growth and increasing stalk rate growth by comparing solar radiation, evapotranspiration (ETo) rates and soil moisture. The information provided here backs up the data extrapolated from soil moisture probes and the concepts introduced in Factsheet 3, which discussed practical strategies to improve water and nutrient uptake to increase productivity and environmental outcomes.

Marian grower Wayne Vickers supplied all of the data interrogated in this fact sheet. Wayne was keen to see if the irrigation strategies advocated actually translated to increased productivity and undertook to measure plant and stalk growth rates for part of the 2022/3 growing season.

These results have been graphed below (Figure 1).

Take home message: Both under- and overirrigation will reduce crop water use (CWU) and slow down plant growth rates, as will solar radiation levels.

Irrigators should allow the plant to extract water to the refill point to accelerate extraction rates, but do not allow stress for extended periods.

There is a trade-off in increasing rooting depth by inducing some stress with reduced plant growth and should be done in the early stages of growth, setting the plant up to maximise extraction rates through the season.

As per previous factsheets:

Increasing crop water use (CWU) increases nitrogen use efficiency (NUE) and NUE increases CWU: a win-win for productivity and the environment.



INTERROGATING PLANT GROWTH FACTORS:



This project is a part of the Mackay Whitsunday Water Quality Program, funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation.







Great Barrier

Reef Foundation



LOOKING AT A SLIGHTLY LONGER PERIOD



FIGURE 2

STALK GROWTH RATE DECLINES WITHOUT IMPROVED IRRIGATION STRATEGY





In Figure 3, extrapolating linear trendlines paints the picture more clearly. Even though soil moisture, radiation and evapotranspiration rates remain flat, stalk growth rates are in decline during overwatering situations, as indicated by the linear trendline and average stalk growth rates. This shows that the irrigation strategy of allowing drawdown and increasing water extraction rates will improve growth rates, increase yields, nutrient/water uptake and improve productivity.

A Win-Win Scenario:

Improving irrigation strategies by applying the right amount at the right time increases productivity and water quality outcomes.