Mackay Irrigation Project

CANEGROWERS MACKAY

FACTSHEET

HISTORY

Total rainfall and especially rainfall distribution patterns have an enormous impact on the volatility of cane production.

Apart from crop diseases Orange Rust in 2000 and Smut in 2008, and tropical cyclones Ului in 2010 and Debbie in 2017, the major contributor to reduced yields is crop water deficit, as demonstrated in Figure 1. Crop water deficit is the amount of irrigation required in a particular year to meet the potential yield.

The capacity to apply water to crops is heavily influenced by increasing water and electricity costs, which have played a major part in yield volatility.

The ever-increasing pressure on growers for both legislative requirements and reducing the environmental footprint on the Great Barrier Reef has provided an opportunity for CANEGROWERS Mackay to get involved through an agricultural economist-led irrigation project working on the ground with growers in real on-farm conditions.

CANEGROWERS Mackay can demonstrate that there can be a huge benefit to increased productivity alongside a benefit to reducing runoff and better utilisation of nitrogen (Nitrogen Use Efficiency, NUE) by improving Water Use Efficiency (WUE) and meeting crop demand for water.

The project entails on-farm audits and economic analysis to determine efficiencies and how best to meet crop demand for water using a combination of agronomic advice, equipment availability, modelling and soil moisture probes. This is backed up by soil cores to determine soil hydrological and chemical characteristics.

The results from the project demonstrate increased productivity, profitability and enhanced environmental benefits.

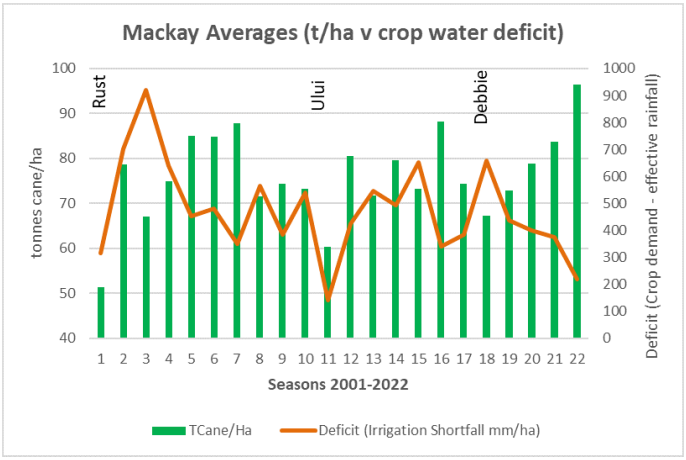

FIGURE 1

RESULTS SO FAR

Project ID	NUE Calculations (kgN/Tc)				Yields				
	Hectares Cane	N Applied	NUE 2021	NUE 2022	10 Year Average	2021 t/ha	2022 t/ha	Difference t/ha 21/22	Increase from 10 Year average t/ha
1	37	150	1.50	1.35	94	103	112	9.28	18.08
2	94	128.69	1.38	1.20	95	96	105	9.30	10.30
3	65	150	1.63	1.47	73	93	103	10.05	29.87
4	121	146.74	1.54	1.38	92	97	108	11.21	16.00
5	161	125.12	1.30	1.17	88	99	111	11.90	22.90
6	45	148.9	1.44	1.34	77	98	111	12.80	33.80
7	178	145.50	1.62	1.43	77	89	103	13.50	25.60
8	113	149.7	1.45	1.27	88	100	115	15.10	27.10
9	64	145.37	1.70	1.42	83	86	103	16.70	20.10
10	42	105.31	1.23	1.03	81	89	107	18.37	26.04
11	175	150	1.83	1.37	92	82	110	28.20	18.20
Totals/ Averages	1,095	141.36	1.54	1.32	94,382	101,685	118,289	16,604	23,906.79
Average t/ha Increase					86	93	108	14	22.5

TABLE 1

Big gains in productivity to date

Average tonne increase over 10 years: 23,900 tonnes of cane over 1,095 ha.
Average increase in tonnes per hectare: from 86 tc/ha average to 108 tc/ha.

Nitrogen Use Efficiency gains

NUE improved from 1.54 kg nitrogen per tonne of cane, reduced to 1.32 kg nitrogen per tonne of cane.

NUE calculations show potential savings of 30 tonnes of nitrogen reducing losses to runoff, drainage, volatilisation and denitrification over 1,095 ha trial.

CANEGROWERS Mackay is showing that:

There is better bang for buck by increasing yields and improving NUE as opposed to cutting nitrogen rates beyond scientific consensus.

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.

Australian Government | REEF TRUST | Great Barrier Reef Foundation

Applying the right amount of water at the right time meets the crop demand for water and increases productivity.

Table 1 (over) shows individual grower increase in productivity ranging from 10 tc/ha to 34 tc/ha above the farm long-term averages.

Unexpected benefits of irrigation strategy and management (Table 2):

- Improved ratoonability and ratoon longevity.
- Increased yields from older ratoons.

Grower 11 (Table 3) has been able to improve the productivity across all of his ratoons for both early and late ratoons. By maintaining the crop demand for water, only allowing some stress at the dry-down stage to increase sugar levels, and by applying water soon after harvest as weather and soil conditions will allow, the productivity and longevity of ratoons has increased.

The older ratoons ranging from 5-7th ratoons yielded on average 106 tc/ha, up from an average of 82 tc/ha covering the western half of the centre pivot and 1-4th ratoons yielded on average 114 tc/ha up from 91 tc/ha on the eastern half of the centre pivot.

Grower 11 has shown continuous improvement since 2019, as the t/ha produced across the whole farm shows in Table 3. This has been achieved by judiciously sticking to an irrigation strategy of meeting crop demand by applying the right quantity of water to fill the profile as soon as readily available water has been depleted. Farm averages have been increased by 29 tc/ha since 2019 and 21 tc/ha over the long term (10 year averages).

Just to prove this was not a fluke, Grower 8 (Table 4) has made similar impressive gains: taking the long-term average up from 94 tc/ha to 111 tc/ha to date across the whole farm.

Controlled irrigation under Centre Pivot (3 years)

Grower 11	1-4R tc/ha	5-7R
10 year Average	91	82
2022 Season	114	106

TABLE 2

Grower 11	Plant tc/ha	1-3R	4-7R	Farm Average
10 year Average	103	91	82	90
2019 Season	103	93	77	82
2020 Season	126	96	94	101
2021 Season	128	103	100	102
2022 Season	120	113	98	111

TABLE 3

Grower 8	Plant tc/ha	1-3R	4-7R
10 year Average	99	98	85
2022 Season	127	115	102

TABLE 4

Continuous gains for environment and productivity by improving irrigation strategies and water management

Unexpected benefits of irrigation strategy and management:

Improved ratoonability

Ratoon longevity

Increased yields from older ratoons