AN EVIDENCE BASED APPROACH TO IMPROVING WATER QUALITY IN THE BARRATTA CREEK CATCHMENT

PROJECT LEARNINGS – YEAR 2

KEY LEARNINGS:

- Carefully manage the first few irrigations to reduce/eliminate the loss of tailwater from the farm. It was evident from all nine trials, that the majority of nutrient and chemical losses occurred in the first few runoff events (irrigations and/or rainfall) after application. Therefore, *the main management actions* that growers using furrow irrigation can take is to:
  - Prevent irrigation tailwater leaving the farm by capturing in well designed and appropriately managed recycle pits before being re-used.
  - Improve irrigation management using scheduling tools which advise when to irrigate based on soil moisture levels, rather than at set time intervals.
  - Automated irrigation to enable prompt switching off when water reaches the end of row.
- Rainfall events are more difficult to predict and manage, but losses can be reduced through:
  - Maximising coverage/placement depth of fertiliser
  - Careful timing of chemical applications to maximise no-rain intervals.
- Most of the trends observed in the trials were carried over into the second year. Due to addressing various site and trial issues identified in the first year, there was higher confidence in the second year results.
- However, ideally the trials should be continued for 3-4 years to provide more information on the relative merits of each management practice in different seasons and crop cycles.

Over the course of the two-year project, there was a strong emphasis on communicating the trial results and learnings to participating growers and stakeholders through meetings and forums. The presentation of the preliminary second year trial results on 24th March had 38 people in attendance. The information was well received, with detailed questions and discussions from the audience.

The key project learnings have highlighted the importance of improved irrigation practices and tailwater capture being recognised in the Paddock to Reef (P2R) reporting and modelling. The inclusion of these practice changes would enable a more accurate representation of the water quality outcomes in the Burdekin region.

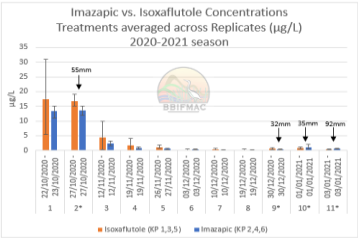
ABOUT THE PROJECT:

This two-year project is an evidence based, farmer driven project that aims to reduce nutrient and agricultural chemical losses from farms in the Barratta Creek Catchment, through trialling a range of farming practices and identifying the relative water quality and productivity merits of each.
The trial consisted of nine sites in the Barratta Creek Catchment, of which seven were carried through both years.
Agronomic guidance was provided by Burdekin Productivity Services (BPS) and Farmacist. BBIFMAC was engaged as an independent organisation to conduct the water quality monitoring.

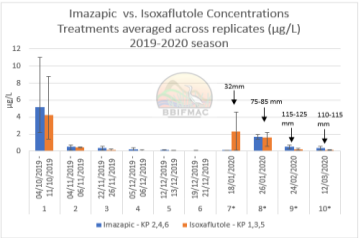
The Barratta Creek Water Quality Project is funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation.

Trial 1 & 2 – Imazapic vs Isoxaflutole Pesticide Trial

YEAR 2 concentrations



YEAR 1 concentrations

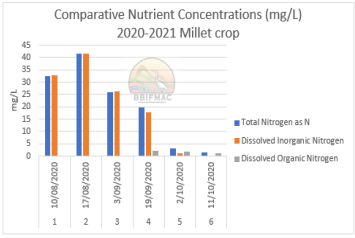


Note: * denotes rainfall event - rainfall figures approx. only

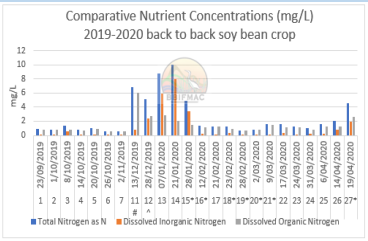
Trial 1 and 2 compared the losses of two pesticide active ingredients, Imazapic and Isoxaflutole at two locations in the BRIA. Across both sites, the highest concentrations occurred in runoff collected from the first few irrigation and rainfall events in both years.

Trial 3 – Successive Soybean Crops Followed by Millet

YEAR 2 concentrations



YEAR 1 concentrations



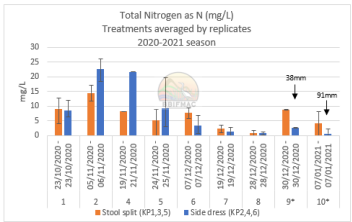
Note: Events 1 & 2 are grab samples from drain.

Note: # pre-water, ^ new crop, * rainfall

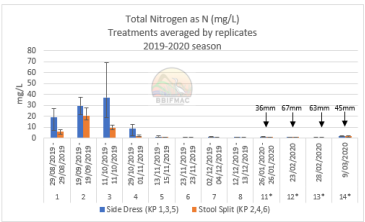
Trial 3 compared the runoff losses from two successive soybean crops in year 1 followed by a millet crop in year 2. The main finding from the trial is that losses can occur from a soybean crop after cultivation/ incorporation of biomass, with rapid conversion of organic nitrogen to inorganic nitrogen in as short a period as 6 weeks in summer.

Trial 4 – Side dress vs Stool split Fertiliser Application

YEAR 2 concentrations



YEAR 1 concentrations

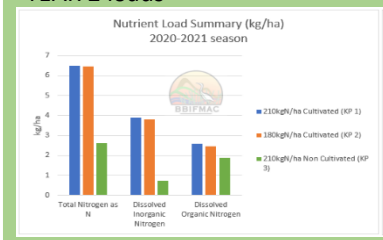


Note: * denotes rainfall - rainfall figures approx. only. Event 3 removed from year 2 data – partial irrigation.

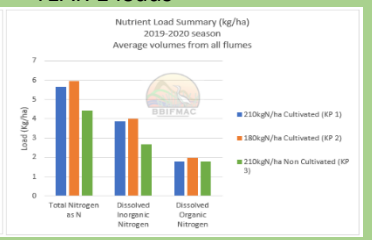
Trial 4 compared two methods of fertiliser application, side dress and stool split. The side dress coverage was suboptimal in year 1 and may have influenced greater losses from this treatment in that year. In year 2 this was rectified and while the side dress treatment generally yielded higher losses in irrigation events, the stool split was higher in rainfall events (likely due to stranded fertiliser in the hill being flushed out).

Trial 5 – Variable Rates of N, and Cultivated vs Non-cultivated

YEAR 2 loads



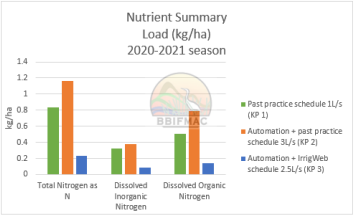
YEAR 1 loads



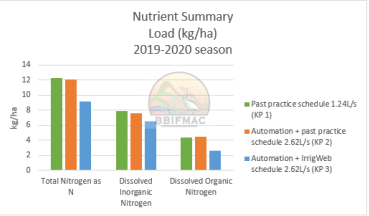
Trial 5 compared two variable rates of nitrogen application, as well as cultivation vs non-cultivation practices. The non-cultivated treatment consistently resulted in lower concentrations compared to the cultivated treatments in both years. Additionally, the non-cultivates treatment recorded the highest yield results in year 1. This suggests that nitrogen rate may not be as important a driver of nitrogen loss as cultivation.

Trial 6 – Irrigation Optimisation

YEAR 2 loads



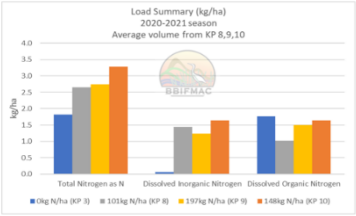
YEAR 1 loads



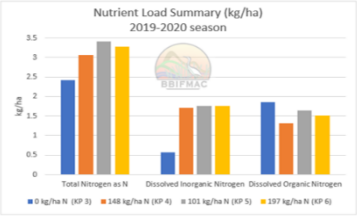
Trial 6 compared three differing irrigation practices, namely the growers past practice schedule, automation and past practice schedule, and lastly automation and IrrigWeb schedule. The same general trend was observed across both years of the trial, with the automation and IrrigWeb schedule yielding lower nutrient losses. This is likely due to lower volumes of water for less duration, resulting in less mobilisation of nitrogen from the hill and lower overall volume of runoff water.

Trial 7 – Variable Rates of N

YEAR 2 loads



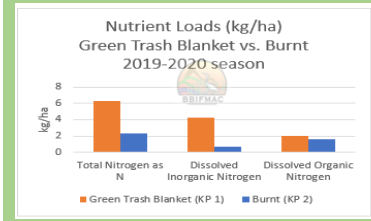
YEAR 1 loads



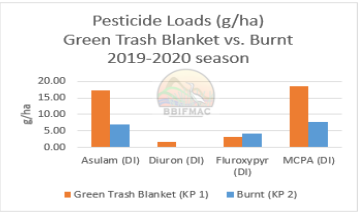
Trial 7 compared four varying rates of nitrogen fertiliser application, namely 0 kg/ha, 101 kg/ha, 148 kg/ha, 197 kg/ha. Differences in the relative dissolved inorganic nitrogen (DIN) losses between the three nitrogen rate treatments are considerably low in both years. Site issues may have affected the water quality results and thus there is low confidence in these results.

Trial 8 – Green Trash Blanket vs Burnt Cane

YEAR 1 nutrient loads



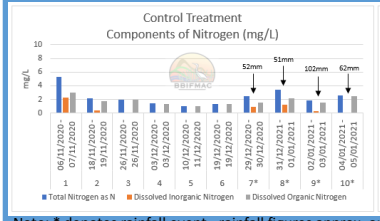
YEAR 1 pesticide loads



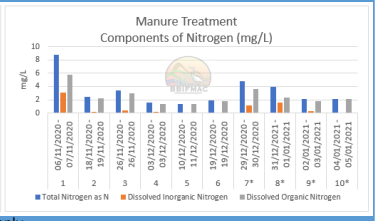
Trial 8 compared green trash blanket with burnt cane. This trial was conducted for one year only. The green trash blanket recorded higher nutrient and pesticide loads compared to the burnt cane. This is likely due to the green trash blanket requiring greater volumes of water for a longer period of time (to get the water through the furrows because of the cane trash slowing the passage), resulting in the water reaching higher up in the hill profile and mobilising more of the fertiliser.

Trial 9 – Manure vs Control Nutrient Application

YEAR 2 concentrations – control



YEAR 1 concentrations - manure



Note: * denotes rainfall event - rainfall figures approx. only

Trial 9 compared the application of manure with a control (Grower's standard practice). This trial was conducted for one year only. Overall the nitrogen losses were around double for the manure treatment compared to the control (likely due to the broadcast application of manure). Additionally, the release of nitrogen was more sustained over the season for the manure treatment compared to the control treatment.