



PATHWAYS TO WATER QUALITY IMPROVEMENTS IN THE MYRTLE CREEK SUB-CATCHMENT PROJECT

2019/2020 WET SEASON - SITE 3 CASE STUDY

SITE DETAILS

BLOCK SIZE: 17.8 ha

SAMPLED AREA: 3,707 m²

ROW SPACING: 1.8 m

VARIETY: Q208[Ⓛ]

CROP CLASS: 3R

HISTORICAL ANNUAL YIELD: 80 tph

SOIL TYPE:

Victoria Plains (cracking clay)

LOCATION IN SUB-CATCHMENT:

Myrtlevale

NUTRIENT AND PESTICIDE APPLICATION DETAILS

Fertiliser application date: 4 October 2019

Herbicide application date: 11 October 2019

Treatment 1

- Blanket spray Bobcat® i-MAXX @ 3.8 L/ha on 11 October 2019
 - Total active ingredient applied:
 - Hexazinone – 475 g/L
 - Imazapic – 95 g/L
- Fertiliser CB 99694** (24 – 3 – 18 - 1.5) applied @ 600 kg/ha with Stool Zippa's raised up to prevent use*:
 - Total N applied: 144 kg/ha
 - Total P applied: 18 kg/ha

Treatment 2

- Band spray (50% of area sprayed – cane band sprayed at full rate; furrow not sprayed) Bobcat® i-MAXX @ 3.8 L/ha on 11 October 2019
 - Total active ingredient applied:
 - Hexazinone – 237.5 g/L
 - Imazapic – 47.5 g/L
- Fertiliser CB 99694** (24 – 3 – 18 - 1.5) applied @ 600 kg/ha with Stool Zippa's fitted to implement and working
 - Total N applied: 144 kg/ha
 - Total P applied: 18 kg/ha

*Stool Zippas were unable to be lifted high enough to not touch the ground, the Stool Zippas were raised up so they were not pushing down as hard as usual.

** urea-based fertiliser blend

- Approximately 100 mm of flood irrigation applied 28 October and 22 December 2019. No run-off occurred from these irrigations.
- 11.4 mm of rainfall on 11 October following fertiliser and herbicide application.

Insecticide application: no imidacloprid applied

Herbicide applications:

- 2019:
 - As above and
 - 5 November 2019
 - 1 L/ha Tordon® 75-D (300g/ha 2,4-D + 75g/ha picloram) + 930 mL/ha MCPA 750 (697.5 g/ha MCPA)
 - Targeting sicklepod
- 2018 (2R)
 - Bobcat® i-MAXX (hexazinone, imazapic) band sprayed @ 3.8 L/ha
- 2017 (1R)
 - Balance® 750 WG (isoxaflutole) @ 200 g/ha
- 2016 (P)
 - Dual Gold® (S-metolachlor) @ 1.8 L/ha

Tested for:

- o Dissolved Inorganic Nitrogen
- o Filterable Reactive Phosphorus
- o Imazapic
- o Hexazinone
- o 2,4-D
- o MCPA

RUN-OFF EVENT DATA

EVENT	DATES	DAYS FROM FERTILISER APPLICATION	DAYS FROM HERBICIDE APPLICATION (BOBCAT I-MAXX® / TORDON® 75D + MCPA)
1	29 to 30 December 2019	87	80 / 55
2	28 to 30 January 2020	117	110 / 85
3	16 February 2020	136	129 / 104
4	23 February 2020	143	136 / 111

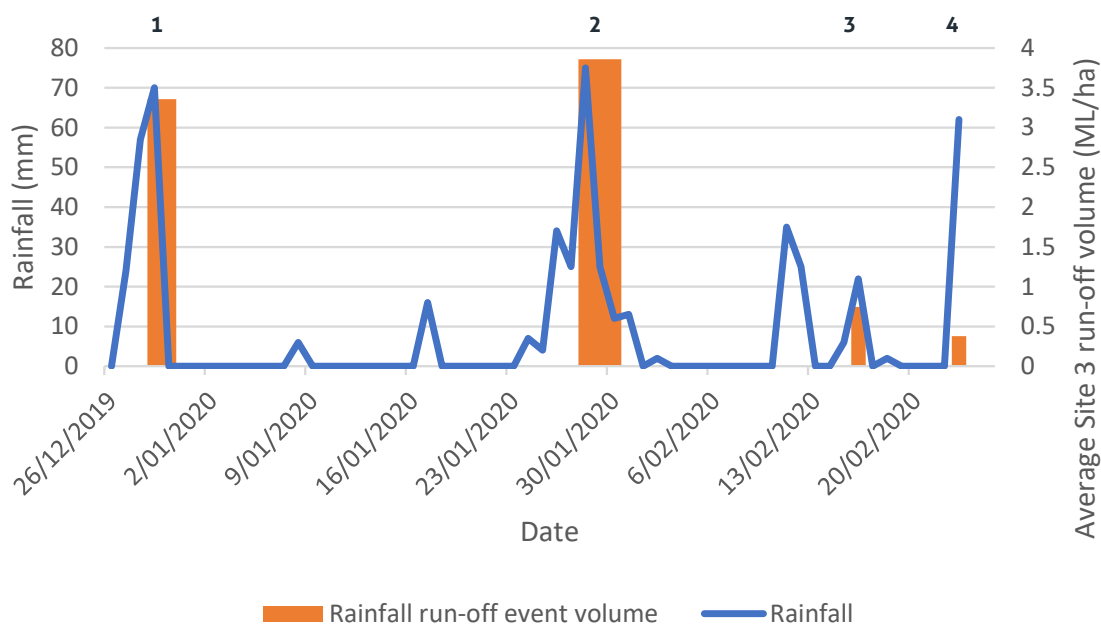


Figure 1 Rainfall data and corresponding volume of runoff events. All events were generated from rainfall. Event 4 resulted in flooding of the site and therefore only the beginning of the event was sampled.

RESULTS

NOTE: Nutrient and pesticide concentrations and pesticide loads are estimates only. Freshwater aquatic ecosystem species protection values cannot be applied to paddock-scale monitoring. These values are referenced only for discussion. Phosphorus (P) concentrations are indicative and actual concentrations are likely to be slightly higher. 1 sample for Treatment 2, event 1 was lost. This sample has been estimated as half the concentration of the previous sample for all analytes.

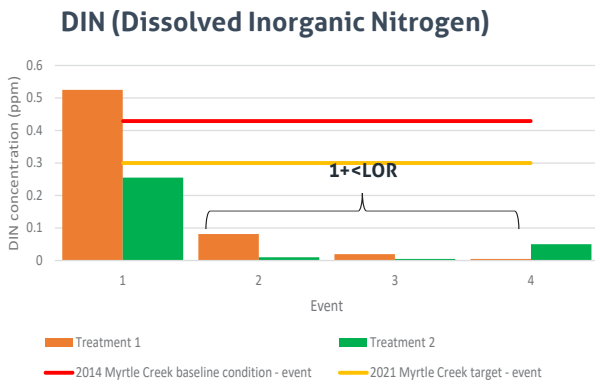


Figure 2: DIN concentration in run-off (ppm). The Mackay Whitsunday Water Quality Plan's DIN water quality in 2014 event conditions was 0.429 ppm and 2021 event target is 0.300 ppm, both for the Myrtle Creek. Provided for discussion only.

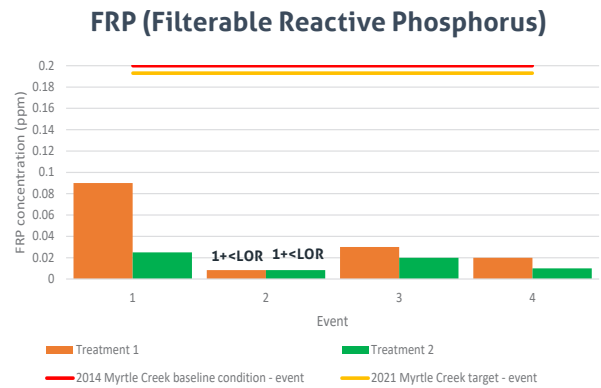


Figure 3: FRP concentration in run-off (ppm). The Mackay Whitsunday Water Quality Plan's FRP water quality in 2014 event conditions was 0.200 ppm and 2021 event target is 0.193 ppm, both for the Myrtle Creek. Provided for discussion only.

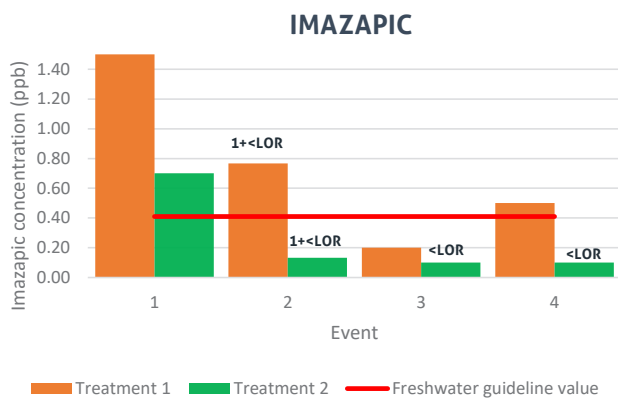


Figure 4: Imazapic concentration in run-off (ppb). Freshwater guideline value is the aquatic ecosystem protection guideline value at the 95% species protection level and is applicable only to freshwater systems. Imazapic value is 0.41 ppb. Provided here for discussion only.

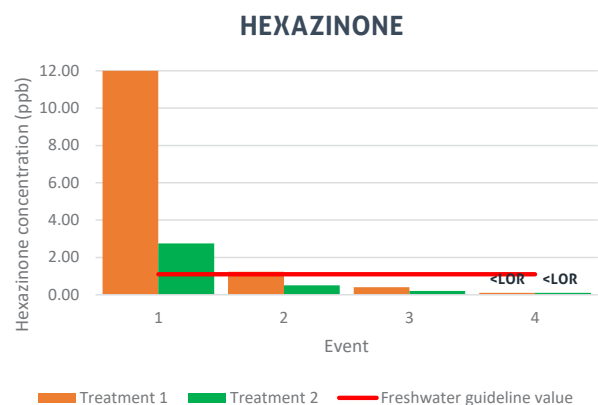


Figure 6: Hexazinone concentration in run-off (ppb) from Treatment 1. Freshwater guideline value is the aquatic ecosystem protection guideline value at the 95% species protection level and is applicable only to freshwater systems. Hexazinone value is 1.1 ppb. Provided here for discussion only.

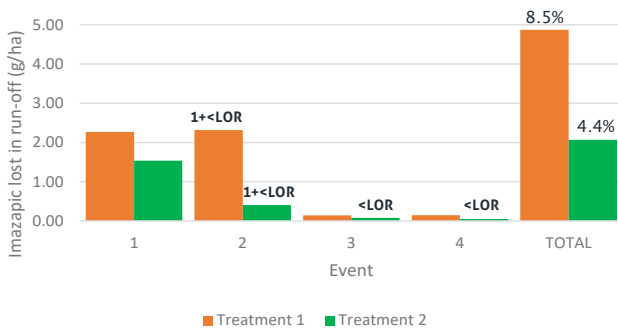


Figure 5: Estimated imazapic in run-off (g/ha) calculated using estimated flow values. Percentage presented above the TOTAL bars provide an estimate of the percentage of imazapic applied lost in run-off.

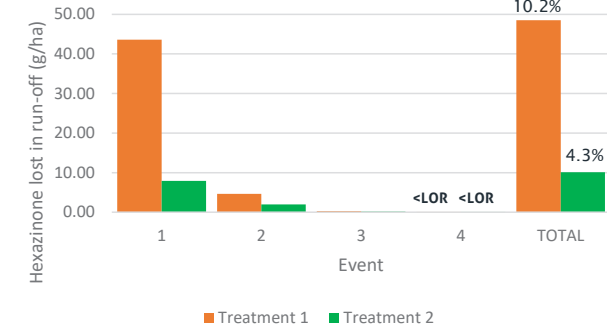


Figure 7: Estimated hexazinone in run-off (g/ha) calculated using estimated flow values. Percentage presented above the TOTAL bars provide an estimate of the percentage of hexazinone applied lost in run-off.

<LOR - please note in this event concentrations were below the lowest observable reading (LOR) of the laboratory equipment. Concentration is provided as half the LOR.

1+<LOR - please note in this event one or more sample concentrations were below the lowest observable reading (LOR) of the laboratory equipment.

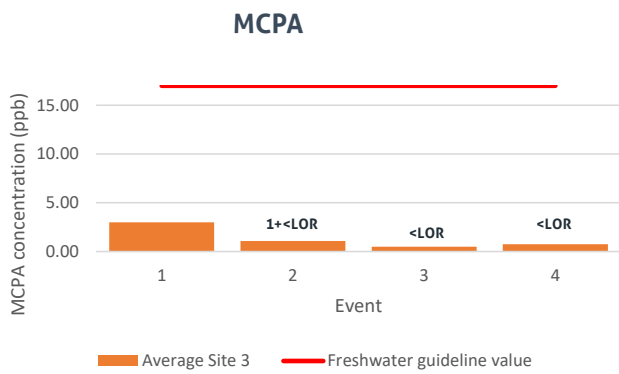


Figure 8: MCPA concentration in run-off (ppb). Freshwater guideline value is the aquatic ecosystem protection guideline value at the 95% species protection level and is applicable only to freshwater systems. MCPA value is 17 ppb. Provided here for discussion only.

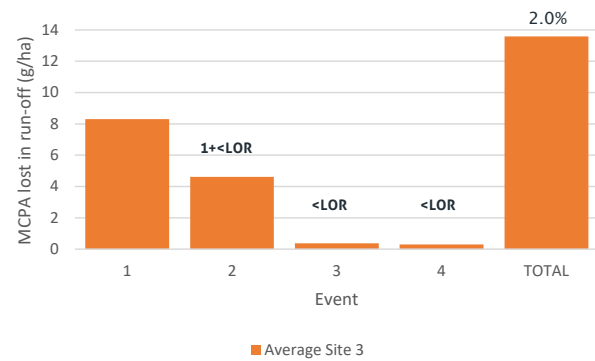


Figure 9: Estimated MCPA in run-off (g/ha) calculated using estimated flow values. Percentage presented above the TOTAL bar provide an estimate of the percentage of MCPA applied lost in run-off.

<LOR - please note in this event concentrations were below the lowest observable reading (LOR) of the laboratory equipment. Concentration is provided as half the LOR.

1+<LOR - please note in this event one or more sample concentrations were below the lowest observable reading (LOR) of the laboratory equipment.

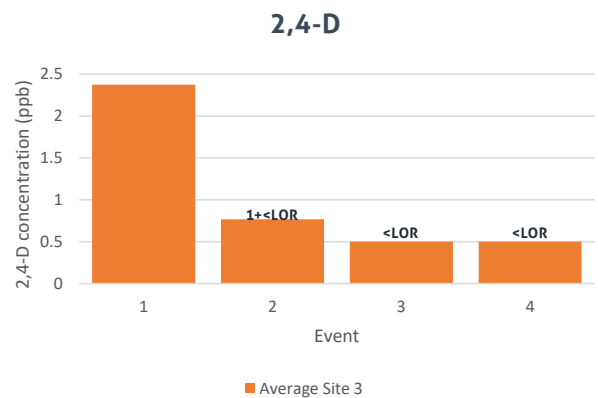


Figure 10: 2,4-D concentration in run-off (ppb). Freshwater guideline value is the aquatic ecosystem protection guideline value at the 95% species protection level and is applicable only to freshwater systems. 2,4-D value is 280 ppb (not shown). Provided here for discussion only.

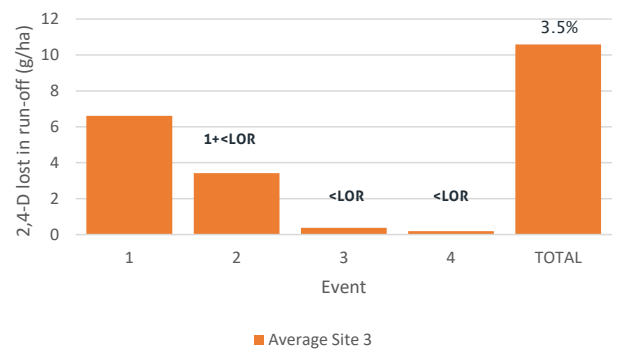


Figure 11: Estimated 2,4-D in run-off (g/ha) calculated using estimated flow values. Percentage presented above the TOTAL bar provide an estimate of the percentage of 2,4-D applied lost in run-off.

DISCUSSION

Please note that all concentrations are estimates only. This is not a replicated research trial. Due to equipment limitations, water samples were unable to be collected for the entire events. This may result in actual concentrations being higher or lower than the estimates provided. The information is provided as a guide for comparison between treatments at this site only.

Research demonstrates the principle 'more on, more off'. This site confirms this, with roughly half the losses of imazapic and hexazinone where Bobcat i-MAXX® was band sprayed (50% less product), than blanket sprayed.

This site demonstrated generally lower concentrations of DIN and FRP were lost where Stool Zippas were used correctly. This may be due to better coverage of fertiliser when using Stool Zippas to close the slot, helping to minimise run-off losses.

Paddock-scale concentrations of pesticides would be expected to be of higher concentrations than in-creek concentrations due to scale and dilution.

Previous research shows losses of 13% of many applied herbicides if run-off occurs after 48 hours or so (this excludes pendimethalin and flumioxazin which have significantly

lower losses, see: Pesticide Risk Matrix handout for more information*). This suggests that application rate is the major influence on losses.

DIN concentrations are generally below the Mackay Whitsunday Water Quality Plan's DIN water quality in event current conditions (2014) and 2021 event target for the Myrtle Creek. Likewise, FRP concentrations are all below the freshwater 2021 target. Whilst paddock-scale run-off cannot be directly compared, this indicates a positive result.

REFERENCES / FURTHER INFORMATION

The Pesticide Risk Matrix - Attachment 1

Run-off Loads Compared to Application Rate. Fillols, E. 2018.

Mackay Whitsunday Water Quality Improvement Plan 2014-2021. Folkers, A., Rhode, K., Delaney, K. & Flett, I. 2014.

FOR FURTHER INFORMATION PLEASE CONTACT

Molly O'Dea [E mo'dea@sugarresearch.com.au](mailto:mo'dea@sugarresearch.com.au) [M 0439 619 082](tel:0439619082)

Copyright © 2020 • All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior permission of SRA. **Disclaimer** In this disclaimer a reference to 'we', 'us' or 'our' means SRA and our directors, officers, agents and employees. Although we do our best to present information that is correct and accurate, we make no warranties, guarantees or representations about the suitability, reliability, currency or accuracy of the information we present in this Information Sheet, for any purposes. Subject to any terms implied by law and which cannot be excluded, we accept no responsibility for any loss, damage, cost or expense incurred by you as a result of the use of, or reliance on, any materials and information appearing in this Information Sheet. You, the user, accept sole responsibility and risk associated with the use and results of the information appearing in this Information Sheet, and you agree that we will not be liable for any loss or damage whatsoever (including through negligence) arising out of, or in connection with the use of this Information Sheet. We recommend that you contact our staff before acting on any information provided in this Information Sheet. **Warning** Our tests, inspections and recommendations should not be relied on without further, independent inquiries. They may not be accurate, complete or applicable for your particular needs for many reasons, including (for example) SRA being unaware of other matters relevant to individual crops, the analysis of unrepresentative samples or the influence of environmental, managerial or other factors on production.

The Pathways to Water Quality Improvement in the Myrtle Creek sub-catchment project is funded by the Queensland Government's Reef Water Quality Program and delivered by Sugar Research Australia and Sugar Services Proserpine.

