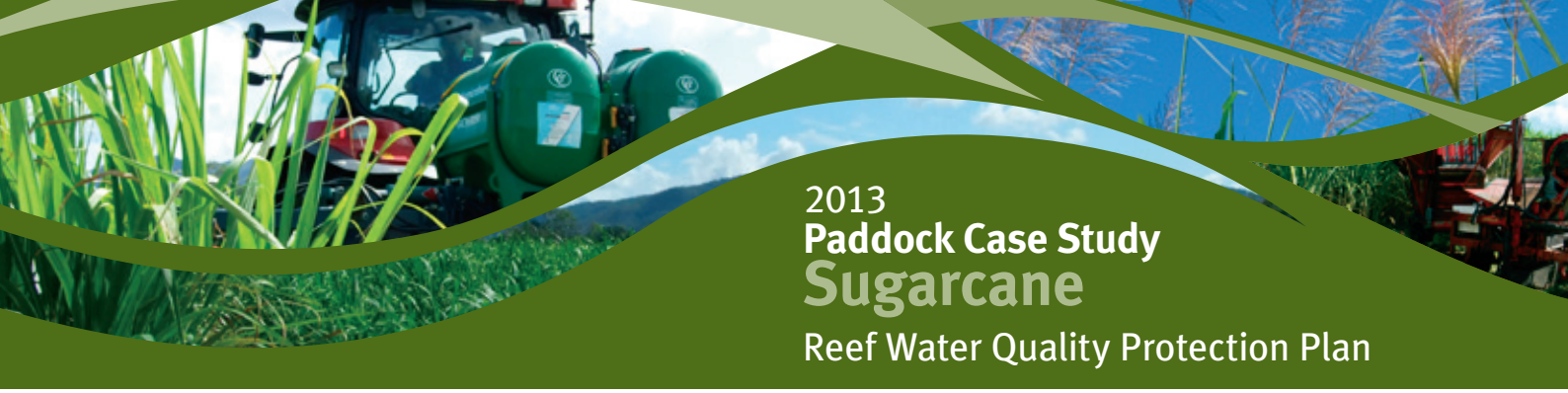


2013
**Paddock Case Study**
**Sugarcane**
Reef Water Quality Protection Plan

# Precision application (band spray) of herbicides on sugarcane in the Burdekin region

## Background

The Reef Water Quality Protection Plan (Reef Plan), a joint initiative of the Australian and Queensland Governments, focuses on the threat posed by diffuse source agricultural pollution. It is designed to reduce the amount of pollutants flowing into waterways and the Great Barrier Reef in order to build the resilience of the reef to impacts of other stressors.

The Paddock to Reef Integrated Monitoring, Modelling and Reporting (Paddock to Reef) Program measures and reports on progress towards Reef Plan and Reef Rescue goals and targets. Funded jointly by the Australian and Queensland Governments, it is a collaboration involving governments, industry bodies, regional natural resource management bodies, landholders and research organisations.

Paddock monitoring and modelling are important components of the program. This work is funded by the Australian Government's Reef Rescue initiative with significant support from the Queensland Government. The program conducts paddock trials in various regions in partnership with other organisations to assess the water quality benefits of different land management practices.

## About this case study

Weeds are a major contributing factor to losses in both production and profits for the sugarcane industry. Although minimum tillage and green cane trash blanketing are considered best practice management in sugarcane, no trash is available for plant cane. In addition, in the Burdekin, bare soil is maintained to allow furrow irrigation. As a result, there are concerns about herbicides being transported to the Great Barrier Reef. Monitoring indicates frequent losses of herbicides in runoff from cane fields in the Burdekin (Davis et al. 2012).

Reducing the use of photosystem inhibiting (PSII) residual herbicides, such as atrazine, diuron, hexazinone and ametryn, and using alternatives such as knockdown herbicides as part of an integrated weed management strategy are considered best practice (Rolfe et al. 2007). Precision application (band spray) is also suggested as an improved practice and can provide large cost savings.

This project measured the amount of herbicides lost in runoff from a standard rain storm applied with a rainfall simulator.

## Methods

This study was undertaken on a sugarcane field with recently emerged ratoon cane. The site had a clay soil (Vertosol), low slope, no groundcover of trash and no weeds.

## Key findings

- Precision application (band spray) will reduce the losses in runoff if a storm occurs.
- Choice of herbicides, and application rates and technologies, provide a wide range of management options for sugarcane growers to control runoff water quality.

Rainfall simulated in runoff trial in the Burdekin.
*Photographer: Jack McHugh, courtesy of BSES Limited.*

The study involved treating plots with different applications of knockdown herbicides glyphosate, 2,4-D amine and fluroxypyr. The herbicide treatments were:

- blanket coverage (100 per cent coverage)
- band spray coverage (20 per cent, 50 per cent and 70 per cent coverage)
- no coverage (0 per cent coverage).

Rainfall was applied at 80 millimetres per hour for 40 minutes, one to two days after herbicide application. Two to four plots of each treatment had rainfall applied using a rainfall simulator.

## Results

Comparing blanket (100 per cent) and band spraying (20 per cent, 50 per cent and 70 per cent of area sprayed):

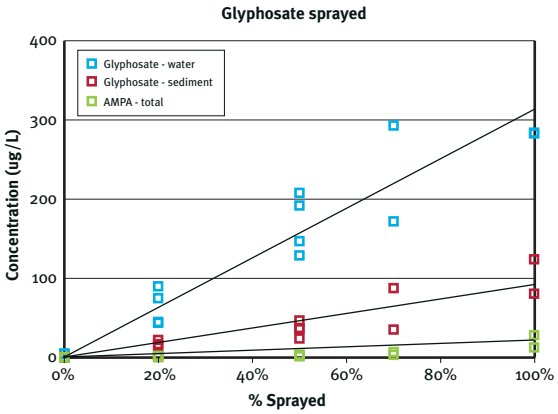
- band spraying reduced the herbicide load on the weeds and soil - 50 per cent spray coverage resulted in half the herbicide load on the field.

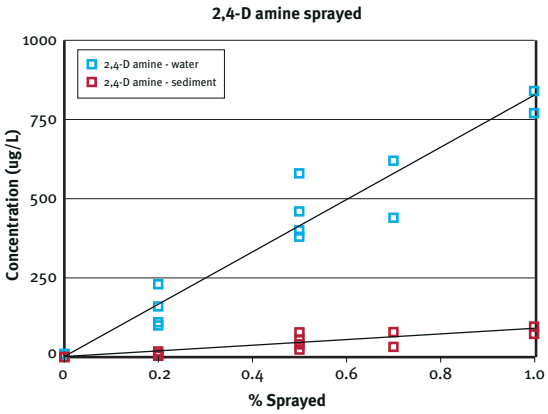
Comparing transport in water or sediment:

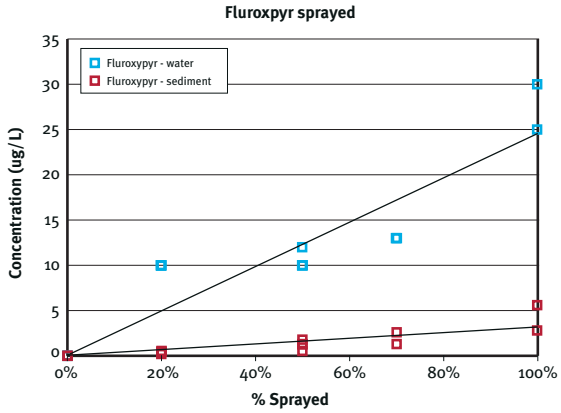
- all three herbicides were mostly transported in water (dissolved) rather than in sediment
- the proportion transported in sediment was higher for glyphosate than for 2,4-D and fluroxypyr
- herbicides transported in sediment are easier to manage than those transported in water through the use of trash blanketing, recycling pits and grass filters etc.

Comparing runoff of knockdown herbicides:

- 2,4-D concentrations were four times higher in runoff, compared with the application rates of the three herbicides
- glyphosate and fluroxypyr had about equal concentrations in runoff (per unit of application rates)
- AMPA, a metabolite (breakdown product) of glyphosate, ran off at concentrations less than 10 per cent of the parent glyphosate, about equal to those of fluroxypyr.




## Other ways to reduce/prevent herbicide runoff

- Avoid spraying when rainfall is forecast. Spray earlier, before the wet season, or when the risk of rainfall is lower (see *First 20 days after herbicide application is critical for runoff in the Mackay Whitsunday region* case study).
- Use banded applications for the more runoff prone residual herbicides.
- Retain cane trash (see *Comparing runoff loss of knockdown and residual herbicides in the Herbert catchment* case study).
- Use an integrated weed management program and do not allow problem weeds to build up.

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## References


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