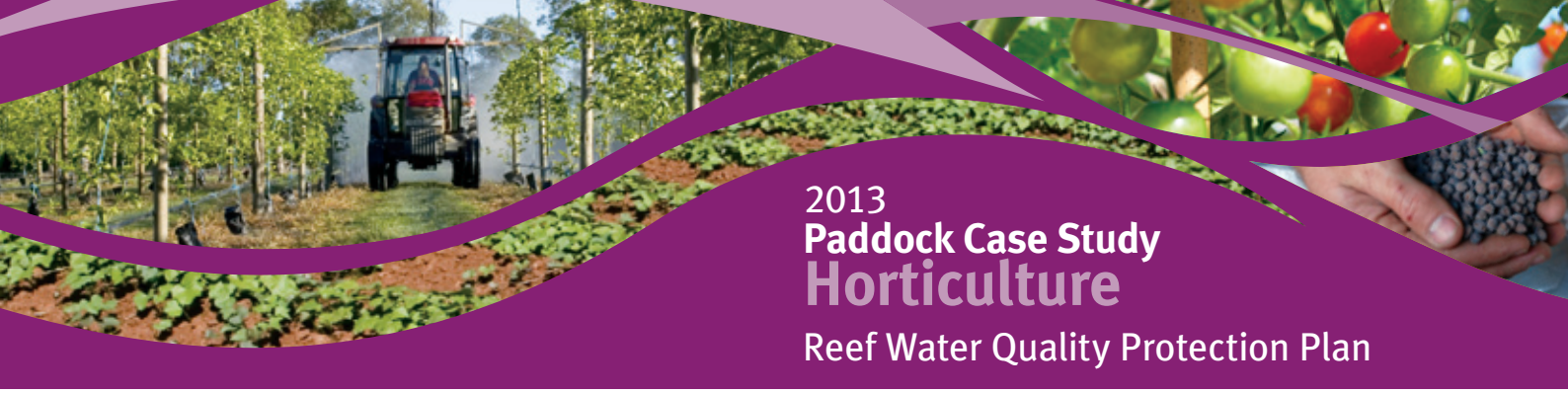


2013
Paddock Case Study
Horticulture
Reef Water Quality Protection Plan

Grassed inter-rows in bananas in the Wet Tropics 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

Bananas are an important crop in the Wet Tropics and are grown on 11,000 hectares. High rates of nitrogen loss in deep drainage have previously been measured from paddocks receiving high rates of fertiliser nitrogen. Since 1995, nitrogen application rates used by the industry have reduced by as much as 40 per cent (Sing 2012).

Key findings

- Improved management practices in bananas have reduced the cost of fertiliser application. In addition, grassed inter-rows have reduced the loss of water and sediment.

Methods

The banana paddock monitoring site is located at South Johnstone approximately 14 kilometres south of Innisfail. It started in 2009 and was established in conjunction with an existing experiment, Building Competitive Banana Production Systems for a Competitive Future.

This site compares B with C class management practices on two adjacent treatment plots testing:

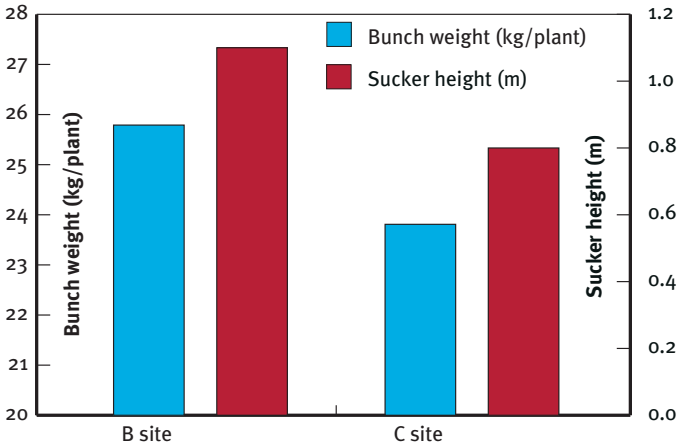
- Frequency and method of fertiliser (nitrogen and potassium) application (B class - fortnightly fertigation, C class – monthly broadcast onto the mound between the double rows of bananas).
- Rates of nitrogen application (B class - doses adjusted according to the expected growth rate for the following fortnight - nitrogen rate 150 kilograms per hectare per year for plant crop and 250 kilograms per hectare for ratoons; C class - constant rate of urea and potassium chloride - nitrogen rate of 250 kilograms per hectare per year for plant crop and 375 kilograms per hectare for ratoons).
- Inter-row groundcover (B class - grassed inter-rows, C class – bare inter-rows). A self-sown grass cover in the inter-row in the B class management practice was maintained by regular mowing. The bare inter-row in the C class management practice was maintained by herbicide spraying.

The trials are being conducted on a Dermosol soil, which is representative of 18 per cent of the banana land use area in the Johnstone catchment. As the average annual rainfall is 3300 millimetres per year, the potential for sediment loss on bare soils in intense rainfall events is very high. The farm is irrigated by under-tree mini sprinklers and irrigation inflows are monitored.

Results

The reduced rate and more frequent application of nitrogen under B class management practice produced similar yield, fruit characteristics and 'follower' sucker growth to that achieved under conventional management. These lower rates of fertiliser application have already been adopted on commercial plantations by some growers without affecting productivity.

Bunch weight and sucker height of banana plants for B and C management practice for the 2010 harvest



The cost of nitrogen fertiliser was $220 per hectare for the B class management practice and $365 per hectare for the C class management practice, a saving of $145 per hectare for the plant crop. In addition, by using fertigation, the B class practice also reduced the application cost by omitting one pass of a tractor and fertiliser spreader each month.

The photographs below were taken minutes apart during a rainfall event in February 2010 before the installation of monitoring equipment was completed. They clearly demonstrate the difference grassed inter-rows make. The B class management practice, with the grassed inter-rows, has no water and sediment movement in contrast to the high (unquantified) sediment load in runoff from bare inter-rows of the C class management practice. However, the grassed inter-rows are difficult to maintain in ratoon crops because of constant traffic and increased shading.

The Paddock to Reef program will continue to measure runoff, sediment and water quality resulting from these two treatments, and gather more information on the productivity and economics of the B and C management practices. For further information on improved banana management practices, see the *Monitoring nitrogen in bananas in the Wet Tropics* case study.

Authors

John Armour, Bronwyn Masters and Christina Mortimore (Queensland Government Department of Natural Resources and Mines).

References

Sing, N.C. (2012). Banana Voluntary Adoption Survey Results, Terrain NRM, March 2012.


B class practice – February 2010


C class practice – February 2010

(Images: John Armour, Queensland Government Department of Natural Resources and Mines.)

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