

Measuring the profitability and environmental implications of adopting Best Management Practices on sugarcane farms in the Wet Tropics

The economic and environmental impacts of adopting Best Management Practice (BMP)¹ have been considered for six sugarcane farms in the Wet Tropics (located near Ingham, Tully, Innisfail, Cairns and Mossman, and ranging in size from 90 to 830 ha). Each of the farms made a number of practice changes over time in the areas of soil health, nutrient management and pesticide management (and drainage improvements at some farms). The profitability and environmental performance of the farms before and after BMP adoption were evaluated using the Farm Economic Analysis Tool and the CaneLCA eco-efficiency calculator, based on farm management data provided by the growers.

Table 1—Examples of practice changes

Soil health
Increased row spacing (some with GPS guidance) and reduced tillage
Nutrient management
Adoption of Six Easy Steps recommendations and legume break crops
Pesticide management
Changes in the types of herbicide active ingredients applied, reduced herbicide applications and more precise applications

Image 1: Farm locations



Were the investments profitable?

Costs before and after BMP adoption were identified for each case study farm. The annual benefit² after BMP adoption was calculated to be positive for each farm, ranging between \$25 and \$220 per hectare per year (Table 1). The results indicate that the adoption of BMPs have added value to each farming business. The payback period calculated ranged between 2 years and 10 years. The economic benefits can be sensitive to changes in cane yields and some growers managed such risks through progressive implementation of the changes or co-investment to reduce capital costs.

Table 2—Investment analyses results³

	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6
<i>Farm size</i>	830 ha	167 ha	240 ha	150 ha	90 ha	760 ha
<i>Cost of implementation</i>	\$338,700	\$28,300	\$2,200	\$100,475	\$151,500	\$735,016
<i>Discounted payback period</i>	5 years	2 years	6 years	8 years	6 years	10 years
<i>Annual benefit \$/ha/yr</i>	\$101	\$100	\$58	\$25	\$220	\$57

¹ BMP, as defined by Smartcane BMP <https://www.smartcane.com.au/>.

² Annualised equivalent benefit (annual benefit) is calculated by taking into account the initial investment and the discounted annual change in gross margin aggregated over the life of the investment, which is then transformed into an annualised value.

³ For farms 3 and 5, cane yields were assumed to increase as a result of BMP adoption, based on the grower's historical production data or previous agronomic research. For the others, cane yields were assumed to remain the same.

What does this mean for the environment?

The environmental evaluation considered four indicators of environmental performance relating to water quality protection, fossil fuel use and greenhouse gas emissions over the life cycle of cane production. The results (Table 2) show that BMP adoption can reduce the potential for water quality impacts, due to less potential for nutrients and pesticides losses as a result of reduced application rates. The reduced fossil fuel use and greenhouse gas emissions are due to less diesel fuel use as a result of reduced tractor movements, but also from less fertilisers being produced in the factory. The amount of avoided greenhouse gases from each farm can be as high as taking 86 cars off the road, but more moderate for other farms. These environmental improvements were found to be quite resilient to the risk of cane yield changes.

Table 3—Reductions in environmental impacts for the case study farms

	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6
<i>Eutrophication potential from nutrient losses to water - PO₄-eq/t cane</i>	18%	17%	17%	31%	31%	2%
<i>Eco-toxicity potential from pesticide losses to water - CTUe /t cane</i>	44%	78%	48%	-9%	22%	53%
<i>Fossil fuel use - oil-eq/t cane</i>	10%	18%	21%	14%	18%	10%
<i>Greenhouse gas emissions - CO₂-eq/t cane</i>	17%	19%	23%	15%	20%	7%

What's the bottom line?

The results suggest that BMP changes in the Wet Tropics can provide both better farm profitability and better environmental performance. In some case studies, economic benefits were sensitive to an increase or decrease in cane yields and it is suggested that before making changes, growers take steps to manage risks (for example, by looking into agronomic research and their individual circumstances). The whole-of-farming system approach taken in the case studies meant that the impact of BMP changes on economic, environmental, agronomic and social factors could be considered and how changing one part of a farming system would affect the other parts of the farming system (reducing the potential for “tunnel vision” when looking at the impact of practice changes).

The results should not be used for the purposes of comparing farms, as each farming business is unique and the situations before and after BMP changes are made are different for each farm. Individual circumstances must be considered before applying the case studies to other situations.

For more information

The case studies were part of a project funded by Sugar Research Australia (SRA project number 2014/015 - Measuring the profitability and environmental implications when growers transition to Best Management Practices). Details of the individual case studies can be found in the case study reports, available at <https://publications.qld.gov.au/dataset/best-management-practices-for-sugarcane>.

For further information about the project please contact the Department of Agriculture and Fisheries on 13 25 23. This publication is an updated version of the fact-sheet.