The economic impact of Banana Best Management Practice (BMP) adoption for growers in the Wet Tropics

Case Study Two: Cameron Mackay

This case study is the second in a series that measure the economic impact of Banana BMP[1] adoption by growers in the Wet Tropics of North Queensland. The study found that adoption of a fallow period and canola rotation crop can help increase farm profitability and provide better environmental outcomes which are critical in meeting community and government expectations. Economic, biophysical and farm management data before and after BMP adoption was supplied by both the grower, and extension officers from the Department of Agriculture and Fisheries (DAF) to determine the impact on business profitability.

Key findings of the Cameron Mackay case study

- Adopting a two year fallow period and canola crop rotation led to an increase in farm profit of $2,924/ha/yr. This was mainly driven by reduced growing costs, particularly the elimination of nematicide costs, and the parameter that nematodes are controlled with impacts in yield and ratoon length.
- Growing canola manages nematodes and negates the use of costly nematicides. If nematodes are not managed they can cause severe economic losses to banana production. Growing canola also reduces pesticide and sediment losses from the farm, to help improve water quality.
- An evaluation of production risk showed that yield would need to decline by more than 4.7% before investing in BMP adoption is unprofitable.

About Cameron's farm

Cameron Mackay manages a 518 hectare (166 hectares currently under banana production) Cavendish banana farm in the Tully region, North Queensland. The farm is owned by the Mackay family and borders the Tully River. The Mackay family have farmed bananas for over 70 years and are the largest banana producers in Australia.

Image 1: Map of farm location

Source: Google Earth, (www.google.com/earth/).

[1] The *Banana Best Management Practices Environmental Guideline* (Banana BMP) is a national guideline to encourage continual improvement and adoption of best practice throughout the banana industry (http://bmp.abgc.org.au).

What changes were made?

One of the key BMP transitions on this farm was shifting from a system where the banana crop was ploughed out and replanted again immediately, to one that incorporated a two year fallow with canola crop rotation, thus breaking the monoculture cycle. This practice has been shown to reduce nematode populations and removes the requirement for nematicide treatments. As a result, adopting this practice also reduces pesticide losses from the farm, to help improve water quality.

Canola fallow crop

Canola (*Brassica napus*) grows well in North Queensland during the cooler months and is effective in managing burrowing nematodes. Growing canola generally requires a one year fallow period; however the Mackay's have chosen to adopt a two year rotation because of the scale of their enterprise and to further improve soil health.

Growing canola manages nematodes and avoids using costly nematicides. Nematodes can cause severe losses to banana production - they reduce yields by destroying corm and/or root tissue. Such losses include fewer ratoons and reduced bunch weights with smaller and poorer quality fruit.

Image 2: Canola fallow crop

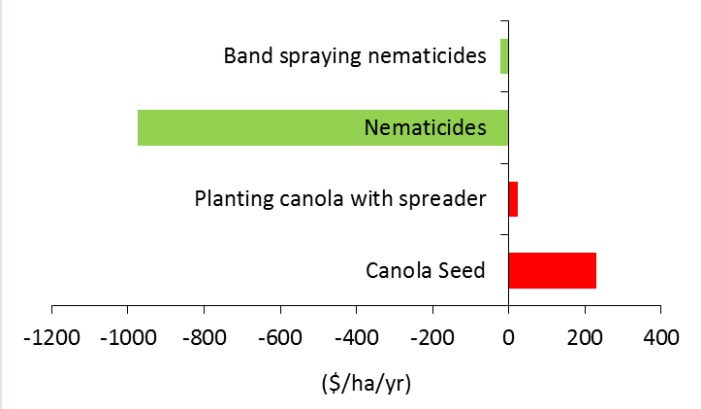
Image 2 Source: Cameron Mackay

The change from plough-out-replant to a canola fallow crop is also expected to deliver many water quality benefits. The canola crop can stabilise bare earth during the rotation stage and provide organic matter to the soil. This helps reduce sediment, nutrient and pesticide losses from the farm.

What does this mean for the business?

This economic analysis compares Cameron's older farming practices to his current farming practices where he has made significant changes. The results indicate an overall reduction in his operating costs of $743/ha/yr (Figure 1) due to adoption of this BMP.

Figure 1: Growing cost changes



Adoption of a Canola fallow crop has resulted in the elimination of nematicide applied on farm. This had led to a saving in nematicide costs of $974/ha/yr, while the largest increase in operating costs was from canola seed ($230/ha/yr).

Nematodes have a negative impact on yield, even when costly nematicides are used[2]. This is the rationale for the following parameters used in the analysis: the plough-out-replant scenario has a 10% lower yield compared to the canola fallow scenario and also has four ratoons compared to six. The actual yield loss could be even higher as stool loss has not been taken into account. Also, the reduction in the number of ratoons means that blocks are re-established more often, increasing costs.

[2] Lindsay, S., Pattison, A. and Murad, Z., (2002), The importance of clean planting material. Bananatopics. 32: 6-10.

Shifting from plough-out-replant to the canola fallow scenario resulted in a $2,924/ha/yr improvement in farm profit. The canola fallow scenario has lower growing costs, an assumed 10% higher yield and land out of production for the two year fallow period.

The total capital cost of canola fallow adoption was $2,000 which is the second-hand spreader that planted canola and will take less than one year to be paid back. The investment analysis shows that the canola fallow scenario has a positive economic benefit of $2,793/ha/yr when taking the investment into account (using the Annualised Equivalent Benefit[3] measure in Table 1).

Table 1: Investment analysis

Capital Cost	$2,000
Investment Horizon	15 years
Farm Profit Difference	$2,924/ha/yr
Annualised Equivalent Benefit	$2,793/ha/yr
Discounted Payback Period	<1 year
Discount Rate	7%

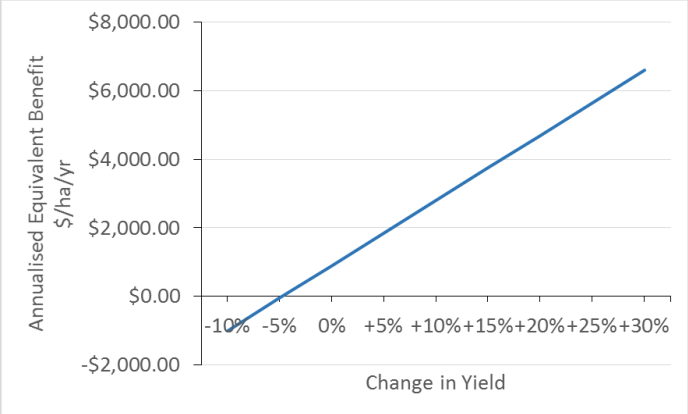
The change from a plough-out-replant to a canola fallow system does not occur overnight as each block is changed at the end of the ratoon cycle. In this analysis, the gradual shift in practices is taken into account.

What about investment risk?

A sensitivity analysis[4] shows that the economic benefit was sensitive to changes in yield. This indicates that the investment viability is very dependent on yield changes and improving or maintaining yield is important for the investment to remain viable.

This analysis is with two additional ratoons and leaving the ratoons the same shows little impact on the break-even yield. The parameter of a 10% higher yield for this Banana BMP adoption could be too conservative or high in reality as each farm situation is different. Therefore a sensitivity analysis has been conducted for this parameter (Figure 2).

Figure 2: Annualised equivalent benefit yield sensitivity



Yield is expected to increase by 10% due to better nematode management and reduced losses from nematode damage. However, the economic benefit of this practice would still break even with a 4.7% decrease in yield.

[3] Annualised Equivalent Benefit (AEB) is the Net Present Value (NPV) of an investment as a series of equal cash flows for the length of the investment.

[4] Figures were held constant for both the 'before' and 'after' scenarios except for the stated yield parameters: banana price of $1.29/kg; yield of 30.3t/ha; hired labour price of $33 per hour; and a fuel price of $1 per litre (net of the diesel rebate and GST).
Price is the three year average for all banana farms in the Wet Tropics from ABS for 2009/10, 2011/12, 2012/13. Yield is the three year average from HAL Banana Industry Benchmarking Report for 2009/10, 2011/12, 2012/13.

What is the bottom line?

The case study results indicate that Cameron's adoption of a two year fallow period and canola crop rotation (included in Banana BMP) increased profitability.

Cameron has eliminated spending on nematicides, which has resulted in an increase in farm profit of $2,924/ha/yr.

Furthermore, the sensitivity analysis indicates that the return on investment was sensitive to changes in yield. If yield decreased by 4.7% then the economic benefit of the investment would break even. This is unlikely as past work has shown it will increase because of the soil health benefits of the practice.

Cameron expects long-term sustainability benefits and improvements in profitability from the adoption of this practice and encourages other growers to make the change.

Every business is unique and before adopting new practices it is important to seek expert advice in order to consider your own specific circumstances. Please contact the DAF customer service centre for further information on 13 25 23.

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