CottonInfo **Information** *when you need it*

CARBON case study

Investigating carbon farming in the Macquarie

Legislation to implement the Emissions Reduction Fund (ERF) came into effect on 13 December 2014. Recent publicity about incentives available through the ERF prompted interest from cotton growers in the Macquarie Valley in central west New South Wales.

Macquarie River Food and Fibre Chief Executive Officer, Susan Madden, sought to investigate the potential opportunities for farmers to participate in the ERF using the newly approved irrigated cotton nitrogen methodology, 'Reducing Greenhouse Gas Emissions from Fertiliser in Irrigated Cotton'.

With several carbon aggregators and interest groups seeking expressions of interest from growers in the area, Susan made contact with the cotton industry's extension program, CottonInfo, for information about ERF methodologies relevant to the cotton industry

This case study explores the potential for the cotton industry to participate in the ERF 'Reducing Greenhouse Gas Emissions from Fertiliser in Irrigated Cotton' method.

Participation in the ERF is voluntary and open to everyone. Parties interested in earning Australian Carbon Credit Units (ACCU) through the ERF must first establish a project which follows the rules outlined in a 'method'.

The 'Reducing Greenhouse Gas Emissions from Fertiliser in Irrigated Cotton' method is the ERF method most applicable to the cotton industry.

This method applies to projects designed to reduce carbon emissions intensity by improving the efficiency of synthetic fertiliser use.

Cotton industry research has shown nitrogen use is the highest contributor to on-farm greenhouse gas emissions, ahead of energy used for irrigation pumping.

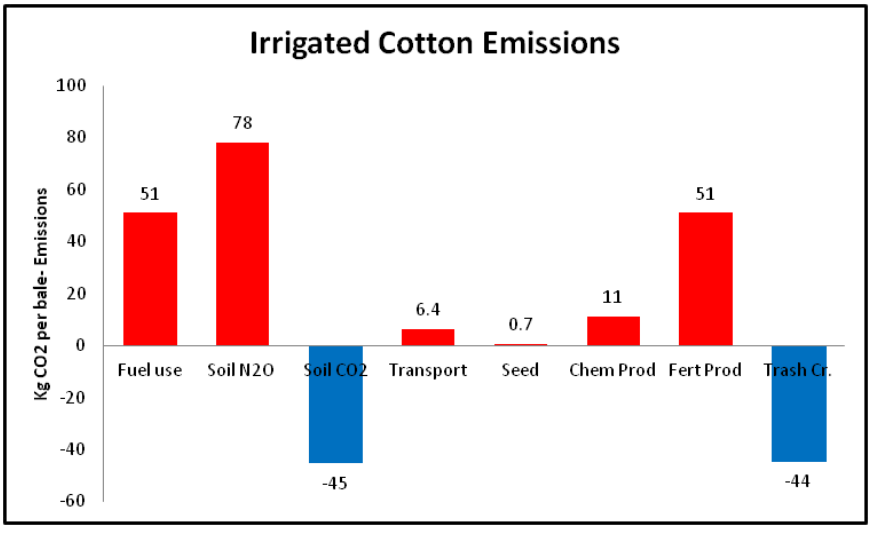

Figure 1. Carbon emissions and sequestration per bale of cotton for a case study farm (Source: Visser et al, 2014)

Best Practice

The application of nitrogen fertiliser can release a potent greenhouse gas (nitrous oxide) into the atmosphere equivalent to 310 times carbon dioxide emissions.

Reducing applied nitrogen is likely to reduce emissions, while making nitrogen use more efficient (by increasing crop yields) will result in reduced carbon emission intensity. These efforts will aid industry in achieving the Australian Government's emissions reduction targets.

Macquarie River Food & Fibre was keen to understand if the commercial opportunities available through the ERF could create a win-win situation, specifically a viable financial reward for good practice, as well as benefits for the environment.

"With the input costs for an average cotton crop getting close to $4000 per hectare, growers need to utilise fertilisers to maximise yield and ensure a return from these expensive inputs. At the same time farmers need to look critically at their operating budget to see where input costs can be reduced, without compromising returns," said NSW DPI Research Economist Janine Powell.

As nitrogen application is critical to the commercial viability of a cotton crop, and nitrogen costs make up a large part of a farmer's budget, Susan Madden believes it's prudent for farmers to understand the policy around this key ingredient.

"It's also important that we understand what other opportunities for carbon credits may exist on other parts of the farm," said Susan.

Other ERF methods based around accumulating soil carbon and native revegetation are described on the Australian's Government Emissions Reduction Fund website: www.environment.gov.au/climate-change/emissions-reduction-fund/methods.

The 'Reducing Greenhouse Gas Emissions from Fertiliser in Irrigated Cotton' method

Through the ERF greenhouse gas abatement is achieved either by reducing or avoiding emissions, or by removing carbon from the atmosphere and storing it in soil or trees.

This method is designed to reduce greenhouse gas emissions from nitrogen fertiliser, by enabling farmers to earn ACCUs in return for new 'management actions' that improve fertiliser use efficiency.

New management actions are those not used in the past six years and must be consistent with relevant *my*BMP standards.

Nitrogen fertiliser use efficiency may be increased by:

- increasing the lint yield of the cotton area without a proportional increase in the rate of nitrogen applied via synthetic fertiliser; or
- decreasing the rate of nitrogen applied via synthetic fertiliser to the cotton area without a proportional decrease in the lint yield.

Actions which may achieve fertiliser use efficiency include, but are not limited to, the following:

- modifying the synthetic fertiliser application rate
- modifying the synthetic fertiliser application timing
- modifying the synthetic fertiliser application method, eg via spreading or placement at depth in the soil
- applying a different type of synthetic fertiliser which: increases the nitrogen available to the plant, and reduces nitrogen losses from the soil.

Further information on this method is available at: www.comlaw.gov.au/Details/F2015L00584.

Financial Analysis: Audit and set-up cost concerns

In response to MRFF's inquiries, the CottonInfo research team modelled a potential scenario involving a grower aggregation registering a project group and bidding into the Emissions Reduction Fund auction as an aggregated project.

Financial analysis of this model returned a number of red flags in terms of the risk to the grower. The greatest hurdle to overcome is the minimum project size of 2,000 tonnes CO2e (carbon dioxide equivalent) per annum for a minimum of seven years.

In order to generate abatement of 2,000 tonnes of CO2e, large tracts of irrigated farmland are required, along with significant numbers of farmers willing to provide historical farming records. To participate in the ERF, changed management activities need to be recorded in accordance with the method and *my*BMP soil health practices (www.myBMP.com.au) to demonstrate an improvement in practices from the 'business as usual' starting point.

The ERF method principles are derived from measuring a baseline scenario on nitrogen use efficiency from six years of previous cropping data.

The aim is to generate revenue through Australian Carbon Credit Units (ACCUs) through improved nitrogen use and therefore reduced future losses of carbon into the atmosphere, thereby reducing total emissions.

Modelled scenarios based on $10/t CO2e (or $10 per ACCU) across 8,000 hectares and five cotton crops, with an 80kg/ha reduction in nitrogen application (assuming yield remains unchanged) barely achieved thresholds for minimum project size required to participate in the ERF auction.

The study found a negative benefit cost analysis due primarily to the uncertainty around the open ended nature of project verification and audit costs. Although the Clean Energy Regulator is working with auditors to try and reduce these costs, (and current ERF project proponents report a reduction in audit costs as methods and systems become more familiar to both users and auditors), uncertainty remains.

Independent third party auditors working with ERF projects have encouraged industry and grower groups to increase project size to achieve critical mass and improve project profitability. However, if more farmers are involved in the project, auditing costs are likely to increase.

Carbon auditors also encouraged industry to consider using a project aggregator to reduce the administrative burden borne by landholders. Information on the aggregation model and ERF projects has been published by the Clean Energy Regulator.

"The policy objective of the ERF is to provide an incentive for the lowest cost emissions reduction activities across the Australian economy," said Jon Welsh, CottonInfo Carbon Technical Specialist.

"The take home message from the industry analysis is that with modest levels of abatement at a farm scale, using the Reducing Greenhouse Gas Emissions from Fertiliser in Irrigated Cotton method, growers would be unlikely to successfully compete at auction against much bigger projects in other sectors with larger economies of scale.

"Land sector ERF projects are essentially competing with the time and resources allocated to other farming activities. Returns need to be considered independently of those ongoing core activities.

"The first ERF auction results of $13.50/t CO2e (average price), indicate that at this stage, cotton farmers who are only considering participation in terms of economic gain from the sale of ACCUs, may well be best to wait and see if the drivers of project returns change over time.

"If the return for ACCUs rises in the future, and audit costs can be reduced, it would be worth re-analysing the economics of participation in the Reducing Greenhouse Gas Emissions from Fertiliser in Irrigated Cotton method through an industry pilot project.

"Sustainability remains a priority for our growers and our industry. CottonInfo nitrogen and nutrition trials keep our farm advisors and growers up-to-date with how and why greenhouse gas emissions occur and how best to optimise crop nitrogen management," said Jon.

CottonInfo is collaborating with researchers from CSIRO, USQ and QUT on finding ways to reduce the cotton carbon footprint at the whole farm level.

Work is currently underway as part of an industry Extension and Outreach grant (supported by Australian Government funding through until June 2017) to create a grower friendly whole farm carbon calculator. This tool will enable growers to calculate their carbon status based on inputs such as land use type and farming practices.

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