

CARBON NEWS

Welcome

Welcome to our first newsletter for WANTFA's Carbon Farming Extension and Outreach Project. The newsletter will provide us with the opportunity to share information on carbon farming and its related policies. We will focus on the science behind carbon sequestration and soil emissions management and the synergies that exist between higher soil carbon content, reduced nitrous oxide emissions and farm productivity. Emissions management for livestock is also important, but our greatest focus will be on cropping systems. The project 'Overcoming Barriers for Western Australian growers to participate in the Carbon Farming Initiative' began in 2013 and will continue for the next four years. WANTFA will be running workshops at new and specific carbon farming events and many popular, existing events and field days. We welcome farmers, industry representatives, researchers and farm consultants to all of these events.

Project description

Within this project we will look to identify and promote the potential synergies that exist between grower participation in the Carbon Farming Initiative (CFI) and profitable agricultural practices. Currently there are a range of research and demonstration projects being undertaken in the WA wheatbelt that will provide several management options for growers. Up to date knowledge and information about greenhouse gas emissions management (from livestock and soils) and increasing soil and vegetation carbon stocks will be made accessible to farmers and their key influencers using our existing extension networks and the extension networks of other similar groups in WA.

Project scope

This project will focus on WA broadacre cropping regions. Extension networks in south-west WA will be used to identify and address information and skill gaps in knowledge systems. The project will add value to other work in this field (by scientific and policy experts), for example the work being done within other Extension and Outreach projects. We will present current factual information on policy and science. Policy conjecture and emissions information that is not supported by good science is outside the scope of this project and its related activities and products.



What else can we tell you about our E&O project and the role of this newsletter?

Project Objectives

- Inform broad acre cropping and mixed crop-livestock farmers in Western Australia of the objectives and outcomes of research and policy (requirements or changes) related to carbon farming
- Build the capacity of the WA agricultural research, development and extension community to deliver consistent and clear land sector emissions management and CFI messages to farmers
- Create an ongoing legacy for farmers to access information about carbon farming and emissions management beyond the life of the project (four years)
- Establish a network of industry professionals and researchers in Western Australia that are working on carbon farming and emissions management projects. This will allow us to work together and collaborate across research and extension projects and deliver consistent messages

Objectives of this newsletter

- Provide information about progress of our carbon farming Extension and Outreach Project
- Update you about the CFI and opportunities for carbon farming and emissions management in a reader friendly format
- Give you contact details and links to help you find out more about the things that really interest or concern you
- Tell you about upcoming events that may be of interest



Breakdown of Australian agriculture's greenhouse gas emissions

Agriculture is responsible for 15% of Australia's greenhouse gas emissions. These emissions are from multiple sources within the agricultural sector. See the table below for a break down.

Emissions sources in the Agricultural sector

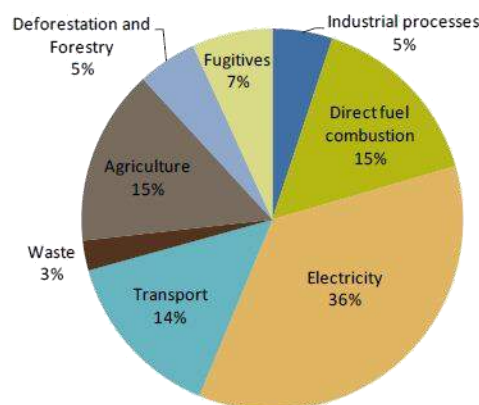
Sources	Description
Livestock	Methane emissions from the digestive process of ruminants.
Agricultural soils	Nitrous oxide emissions from the application of nitrogen to soil.
Field burning of agricultural residues	Methane and nitrous oxide emissions from the combustion of plant material.
Manure management	Methane and nitrous oxide emissions from the treatment and decomposition of manure under anaerobic conditions.
Prescribed burning of savannas	Methane and nitrous oxide emissions from burning of savannah and temperate grassland ecosystems.
Rice cultivation	Methane emissions during rice growing from the decomposition of organic material.

Adapted from Australian Government Department of Climate Change and Energy Efficiency (2012) Agriculture emissions projections 2012, DCCEE, Canberra, ACT. The document is available on the web at: www.climatechange.gov.au

Australia's emissions by sector

For more info look up:

www.carbonneutral.com.au



The Extension and Outreach Program (through which this project is funded) is administered by the Australian Government Department of Agriculture and it helps to:

- provide technical information and support about integrating carbon management into whole farm planning and farm performance
- share new research and farming techniques, increase communication resources and channels available
- create tools and information systems to improve knowledge of land sector emissions enhance productivity and environmental sustainability.

What is the CFI?

The Carbon Farming Initiative (CFI) is a voluntary carbon offset scheme that provides a financial incentive for farmers and land managers to reduce emissions of greenhouse gases or to sequester carbon in the landscape. It has been in action in Australia since 2011.

If you are interested you can find out more in the Carbon Farming Initiative Handbook:

www.climatechange.gov.au/reducing-carbon/carbon-farming-initiative/carbon-farming-initiative-handbook

Its not just about carbon...

Nitrous oxide emissions from agricultural soils

Agriculture generates 75 per cent of Australia's nitrous oxide emissions (a greenhouse gas with 300 times the global warming potential of carbon dioxide). Of the total amount of nitrous oxide emitted from agricultural soils each year, about a third is generated when microbes convert soil nitrogen into nitrate (nitrification) and nitrogen gas (denitrification).

The amount of nitrous oxide released from agricultural soil is a function of:

- the amount of carbon (energy) available for soil microbes to convert soil nitrogen
- the amount of soil moisture available (more moisture leads to more nitrous oxide)
- the amount of nitrogen added to the soil via fertilisers, manure and urine.

Nitrous oxide emissions from Australian cropping systems vary widely from 0.3 kg N/ha/year in low rainfall areas, such as the coarse sand cropping systems in Western Australia; to 35 kg N/ha/year in high rainfall cropping systems on acid soils in Victoria.

Procedures developed to enable farmers to earn carbon credits by lowering nitrous oxide emissions, involve the use of nitrification and urease inhibitors. In future, they may also include changes to ferti-

liser management practices (split applications, use of slow release fertilisers), stocking rate and grazing management, diet formulation and feeding systems. However, there are currently no approved methodologies under the CFI to support these abatement measures.

Using nitrification and urease inhibitors and altering livestock diets to reduce urea production qualify as 'additional' under the CFI as these methods are not currently widespread.

Most of the nitrous oxide research so far has been focused on establishing the amount of nitrous oxide released from different farming systems and environments and investigating ways to lower the emissions from these systems. The research has not investigated the economics of the proposed abatement methods (for example, the use of nitrification and urease inhibitors) so the viability of these practices is not yet known.

Co-benefits of reduced N₂O emissions for farmers

- Reducing N₂O emissions can improve efficiency of fertiliser use, that is, more fertiliser could be converted to production rather than wasted via nitrous oxide emissions and nitrate leaching.
- In animal systems, a more efficient use of dietary nitrogen will lead to more productivity per unit of feed.

Issues

- To attract CFI accreditation, nitrous oxide abatement methods need to be considered as 'additional'
- These 'additional' practices such as the use of nitrification inhibitors are very expensive.
- Soil carbon content is a driver of nitrous oxide emissions so pursuing soil carbon sequestration will work against nitrous oxide abatement.
- Conversely, pursuing nitrous oxide abatement could work against soil carbon sequestration. The whole system must be considered to ensure that its total carbon footprint is lowered.

For the entire fact sheet and list of references please go to http://www.agric.wa.gov.au/objtwr/imported_assets/content/sust/cfwano9web.pdf

For more information please refer to [agric.wa.gov.au](http://www.agric.wa.gov.au) or contact: Henry Brockman
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Chamber to collect samples of air that are analysed for nitrous oxide. Photo taken at WANTFA's Cunderdin long-term site.



Why would a wheat farmer want to reduce emissions and store carbon?

Lauren Celenza, WANTFA Extension Manager

Despite the legislation surrounding a carbon tax and climate change action being under development, farmers should be on the front foot in order to reap the benefits of carbon farming practices. The benefits of storing carbon don't stop at selling carbon credits. Doing something about climate change like adopting practices that help to mitigate the impacts of climate change and increased climate variability could improve productivity and play a vital role in making your farm a sustainable enterprise!

Farmers are leaders in coping with climate variability. Scientists are anticipating that this variability has/will increase with climate change and present farmers with greater challenges. There is a place for

farmers in all climate change related policies like the Carbon Farming Initiative (CFI) that provide the incentives for farmers to be proactive in mitigating greenhouse gas emissions. Sequestering carbon can help to achieve this mitigation of emissions *and* help to improve the resilience of your farm under variable climate conditions.

Why would you want to be proactive and adopt carbon farming practices without a financial incentive?

- (1) Improve soil quality
- (2) Increase the capacity of your soils to store plant-available nutrients and water
- (3) Reduce erosion
- (4) Potentially increase yields
- (5) Improve farm sustainability
- (6) Improve fertiliser use efficiency



Key Words

Carbon farming: Farming in a way that reduces emissions or sequesters carbon in vegetation or soils.

Carbon sequestration: The capture and long-term storage of CO₂ in the terrestrial landscape (vegetation or soil).

Soil carbon: Soil carbon is essentially, the carbon stored within the soil. There are multiple forms of soil carbon each contributing to different attributes of the soil. What we are talking about when we wish to sequester carbon is the carbon that is part of the soil for the long term. For example, humus.

Carbon credit/s: A carbon credit can be generated for each tonne of CO₂- equivalent when an appropriate methodology is applied. It is issued for each tonne of CO₂-equivalent avoided (in terms of emissions) or sequestered.

Carbon credits issued under the Carbon Farming Initiative are called Australian Carbon Credit Units (ACCUs). These credits can be traded in a market in Australia. Carbon credits do not have an expiry date so they can be banked for future use or traded immediately upon issue.

Abatement: Reducing the amount of greenhouse gases released into the atmosphere. This term is often used interchangeably with mitigation.

What farming practices can earn you carbon credits? — The CFI Positive List

The 'positive list' is a register of abatement activities that are eligible to earn carbon credits under the CFI. The positive list helps ensure that, under the CFI, credits can only be issued for additional abatement.

The following activities are currently on the positive list

Vegetation and wetland restoration projects

- The establishment of permanent plantings on or after 1 July 2007.
- The human-induced regeneration, on or after 1 July 2007, of native vegetation, on land that is not conservation land by the:
 - (i) exclusion of livestock, or
 - (ii) management of the timing and the extent of grazing, or
 - (iii) management, in a humane manner, of feral animals, or
 - (iv) management of plants that are not native to the project area, or
 - (v) cessation of mechanical or chemical destruction, or suppression, of regrowth, or
 - (vi) the rehabilitation of scalded soils on rangeland, by the creation of shallow earth banks or furrows to trap rainfall or slow water runoff.
- The protection of native forest from harvest where the landholder received consent to clear before 1 July 2010 and in circumstances described in Paragraph 3.28(1)(p) and 3.28(1)(o) of the CFI Regulations.
- The restoration, on land that is not conservation land, of natural wetlands that had been drained.
- A forest project accredited under the Australian Government's Greenhouse Friendly Initiative.
- Permanent plantings projects accredited under the:
 - (i) New South Wales Government's Greenhouse Gas Reduction Scheme, or
 - (ii) Australian Capital Territory Government's Greenhouse Gas Abatement scheme.
- Permanent plantings established before 1 July 2007 for which there is documentary evidence that demonstrates, to the satisfaction of the Administrator, that the primary purpose of the plantings was generation of carbon offsets.
- The establishment of a new farm forestry plantation.

Livestock Management

- The capture and combustion of methane from livestock manure.
- The reduction of methane emissions through the management, in a humane manner, of feral goats, feral deer, feral pigs or feral camels.
- The reduction of emissions by feeding one or more of the following:
 - (i) tannins to livestock;
 - (ii) Eremophila spp. to livestock;
 - (iii) fats or oils, or both, to dairy cattle that are pasture grazed for more than 9 months each year.

Other

- The application of urease or nitrification inhibitors to, or with, livestock manure or fertiliser.
- The application of biochar to soil.
- Early dry season burning of savanna areas greater than 1km².

See: www.climatechange.gov.au/reducing-carbon/carbon-farming-initiative/activities-eligible-and-excluded/positive-list/positive-list-activities

Are farmers willing to adopt carbon farming practices?

**Nikki Dumbrell, WANTFA
Carbon Farming Extension
Officer**

What carbon farming practices are crop and mixed crop-livestock farmers' most willing to adopt on their land? Are farmers willing to adopt the practices that are supported by the current policy schemes? Those were the questions I asked in my Honours research project at UWA in 2013. The survey-based study examined the factors that are affecting farmers' decisions to change their management practices in the face of increasing greenhouse gas emissions and climate change.

Along with Dr Marit Kragt and Dr Fiona Gibson I aimed to determine the willingness of farmers to adopt different carbon farming practices. This was done alongside an analysis of farmers' attitudes and experiences with climate change, and the importance of the potential co-benefits of carbon farming in farmers' decision making.



What did we find?

The carbon farming practices that most farmers identified as those that they would be 'most likely to adopt' were retaining stubble after crop harvest and adopting no-till cropping practices. We know that these practices have already been widely adopted by WA farmers. In terms of carbon storage potential stubble retention and no-till cropping tend to limit the loss of carbon from the soil but are less effective than some of the alternate carbon farming practices at building carbon in the soil. Practices that are more effective are: applying mulch or applying biochar, planting deep rooted perennials and revegetating less productive areas.

No-till cropping practices and retaining stubble, unlike planting trees and establishing areas of native vegetation, require very little to no land to be removed from the cropping rotation and help to improve soil health and reduce erosion. These benefits were identified as the most important co-benefits of carbon farming by the survey respondents. The practices that farmers are least willing to adopt require the farmer to do a fair bit of work and are likely to be costly. For example, planting trees was not favoured by farmers. Also the least favoured practices tend not to offer some of the most important co-benefits such as improved productivity and profits!

Since the practices that farmers are most willing to adopt have already been adopted, they are not eligible to earn credits under the CFI.

Under the CFI, a farmer can earn credits for carbon sequestered through establishing areas of native vegetation but so far there has been little to no adoption of this practice because it remains too costly or the benefits are unclear.

What can we conclude?

Firstly, farmers will need to carefully consider the economics of participation in the CFI. Secondly, flexible policy should allow farmers to select the carbon farming practices that are most appropriate for their farm system and their management strategy. Moreover, many conservation agriculture practices are not yet approved methodologies under the CFI. But, research continues in this area. Lastly, farmers have identified much uncertainty surrounding the benefits of carbon farming in their production. This uncertainty is a factor discouraging them from adopting carbon farming practices.

We need to focus on the important co-benefits that these practices can deliver that are yet to be recognised in any markets! Important benefits include soil health and climate change adaptation capacity.

Nikki Dumbrell, WANTFA's new Carbon Farming Extension Officer is responsible for the Carbon Farming Extension and Outreach Project. Nikki has just completed a Bachelor of Science (Environmental and Natural Resource Economics) with Honours in Agricultural Economics. Nikki grew up on a dairy and beef farm near Walpole, WA. Her interests include resource and food security, adaptation to- and mitigation of the impacts of climate change.

Our next issue will be out in April, 2014.

Until then, please feel free to contact us with any questions, comments or submissions for the next issue.



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Upcoming events

WANTFA Regional Crop Updates — Dowerin Community Club, Tuesday 18 March 2014

WANTFA Open Day — CSIRO, Floreat (Perth), Thursday 3 April 2014

WANTFA Spring Field Day — Cunderdin, Tuesday 2 September 2014

This newsletter is produced as a part of WANTFA's Extension and Outreach Project called "Overcoming barriers for WA growers to participate in the Carbon Farming initiative". This project is supported by funding from the Australian Government.