



NewsLetter No: 2 November 2003

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Foreword

by Richard Eckard, GIA Project Leader

Due to the extensive overlap between the "Greenhouse and Climate Change in Victorian Agriculture (GCCA)" project and the "CRC for Greenhouse Accounting's new 'Non-CO2 greenhouse Emissions from Agriculture'" program, it made sense to combine both into a single newsletter. This combination expands this newsletter to not only report on the GCCA Climate Change module, led by Adam Hood (not part of the CRC), but now includes the additional CRC sites at Griffith and Narrabri, plus the CRC's projects F2 and E3 (described below).

However, this makes for a longer newsletter, but well worth the read, as this merely emphasises how the project team has grown and is now functioning nationally. We have provided sub-titles through the newsletter for those only interested in individual aspects.

The GCCA project team was recently awarded the PIRVic/DPI Sustainability Initiative award for the projects efforts towards ensuring a sustainable and viable agricultural industry. Well done to all the team members.

2nd Joint Australia and New Zealand Forum on Non-Co2 Greenhouse Emissions from Agriculture:

The Australian Greenhouse Office recently sponsored the above forum in Victoria, held between the 20th and 22nd October 2003. This forum was organised jointly by Richard Eckard, Tim Clough (Lincoln University, NZ) and Harry Clark (AgResearch, NZ). The forum brought together over 50 researchers working in non-CO2 emissions from agriculture in Australia and 20 from New Zealand. The forum also invited Dr Søren Petersen, Danish Institute of Agricultural Science, and Dr Cesar Izaurralde, Joint Global Change Research Institute, Maryland, USA to address the forum on the research being conducted in the European Union and USA, respectively.

In response to the recent Australia/New Zealand bilateral Agriculture and Greenhouse Partnership agreement, the aim of the forum was to action this partnership by developing joint collaborative projects between researchers in both countries, capturing the best technical skills and economies of scale between the two countries. The forum has now led to a number of joint projects being explored.



Rob Baigent explains the equipment at the Kyabram site, during a field visit by delegates from the Non-CO2 forum.

The proceedings of the forum contain 70 abstracts, comprehensively summarising all the recent and proposed research in this area in Australia and New Zealand - this document will be available from our web site by early next year.

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Example map of land suitability changes in a 'new' future climate.

GCCA, Climate Change Module

By Adam Hood, Climate Change Module leader, DPI

Over the past three months, the Climate Change project has been involved in a range of communication activities including:

* Seminar on Greenhouse and Climate Change in the South West:

Members of GCCA and the Victorian Greenhouse Policy Unit (GPU) presented information on climate change impacts and adaptation at a seminar held at DPI Hamilton on 11 November. Attendees represented Local Government, Catchment Management Authorities, farmers and DPI Regional Services. Amongst other speakers, Jennifer Cane from the GPU reported on the implementation of the Victorian Greenhouse Strategy. Adam Hood provided an overview of the key issues of long term climate change as well as highlighting key aspects of the GCCA project. Final discussion raised the importance of considering the relationship between climate change and salinity risk management/action (essentially lowering water tables) plans of CMAs in the region.

* Presentation to Victoria University - Werribee Technology Precinct:

On November 12, Adam Hood presented some of the work of the GCCA to a public seminar in Werribee. The seminar was by a range of students, academics and members of the community. The discussion following the presentation showed that the community is divided on the issue of climate change and variability. Some suggested that what we are seeing is due to natural changes in the earth's atmosphere, while others stressed that "it's time to panic" and that governments must act urgently.

* Developing a new CRC for Climate Variability:

Daniel Rodriguez and Adam Hood took part in a workshop aimed at a new CRC focussing on Climate Variability. The workshop discussed the Vision and Mission of such a CRC, what work might be conducted and who would benefit. Key themes of the CRC would involve linking and improving climate modelling and systems modelling applications for use by a range of sectors including rural enterprises, the water sector, tourism, natural resource management and policy sectors. At this stage the CRC is intending to be a joint public & private venture.

CRC-PROJECT F1: Environmental and Management Drivers of Non-CO2 Greenhouse Gas Emissions in Agro-Ecosystems

by Ian Galbally, Project F1 Leader



Fiona Barker-Reid addressing a group of farmers at the

The CRC project F1 has now established four sites measuring nitrous oxide emissions from agriculture, and two sites measuring enteric methane emissions.

Rutherglen site

At each nitrous oxide site there will be two treatments: one to determine emission factors of nitrous oxide from nitrogen fertiliser usage, in support of national emissions estimates, and second, a treatment designed to test industry-appropriate emission mitigation options.

This project over the life of the CRC will substantially increase our knowledge of methane and nitrous oxide emissions from agriculture in Australia, and will provide the basis for some initial studies of best management practice options for agricultural industries.

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Fiona and Ken download data from the chambers

CRC-F1, Grains Module, Rutherglen Site

by Fiona Barker-Reid, DPI Rutherglen

It's been a busy few months for the Rutherglen experimental site. The site produces daily emissions of greenhouse gases from three treatments:

- * conventional cultivation, burned - N fertiliser applied
- * conventional cultivation, burned - no N fertiliser applied
- * direct drilled, stubble retained - N fertiliser applied

With 240 mm of rain since August, we have had a few opportunities to apply urea. We hope to get some substantial results from that time period.

The mobile gas chromatograph unit has been temporarily relocated from Ellinbank to the Rutherglen site and has been fully commissioned for use. It now operates 24 hours per day, 7 days a week, analysing gas samples collected from the site. It provides an automated injection process that enables sample analysis in the absence of an operator and has proved to be of enormous benefit.

There have also been a number of visitors to the site. On September 11, 2003 we met with a group of farmers visiting Rutherglen for the Riverina Plains Inc. GRDC Update. They had an inspection of the site and expressed an interest in the current project.

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CRC-F1, Cotton Module, Narrabri site

By Peter Grace, QUT

The CRC cotton module commenced in mid-September at the Australian Cotton Research Institute near Narrabri with the commissioning of fully automated gas sampling equipment in collaboration with the Institute for Meteorology and Climate Research from Garmisch in Germany. Eight chambers were installed with an in-line field gas chromatograph to continuously monitor nitrous oxide, CO₂ and methane emissions in irrigated

cotton and wheat-vetch-cotton treatments.

Soil moisture and temperature probes were also installed to complement the on-site weather station. Preliminary data suggests emissions significantly increased within 2 hours of the first rainfall event. As of early November, emissions in drying soils were understandably low, but the soil profiles are well stocked with nitrates at this early stage of crop growth.

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Peter Grace and Deli Chen install new chambers



Mick Meyer demonstrates the chambers to visitors from the non-Non-CO2 forum

CRC-F1, Dairy Module, Kyabram Site

by Kevin Kelly and Rob Baigent, DPI Kyabram

The CRC dairy module is in full-swing with all the equipment at the Kyabram site up and running. Data collection with the Micro-Meteorological system commenced in July, and the enclosure chambers in mid-September. The first differential treatment of nitrogen has just been applied to the chambers in line with experimental protocols.

The dairy team is soon to be complemented by a new micro-met scientist, Dr. Frances Phillips. Frances is a PhD graduate from Wollongong University with expertise in spectroscopy. Frances comes to DPI from the Antarctic Division where she has worked for approximately 4 years. Frances's time at the Antarctic Division has included 2 over-winter stays in Antarctica looking after spectroscopy equipment and collecting data on the Division's upper atmospheric monitoring programs. Frances is set to commence work with the dairy team in December and will be involved in the processing of data in combination with CSIRO, and supporting PhD students within the team.

The Kyabram site hosted a group of 30 delegates from the 2nd Joint Australia and New Zealand Forum on Non-CO2 Greenhouse Gas Emissions in October. The delegates inspected the extensive range of equipment installed at the site with feedback highly positive and in some cases verging on envious!

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CRC-F1, Methane Module, Ellinbank & Hamilton Sites

By Martin Auld and Bruce Knee, DPI Ellinbank and Hamilton

At present the CRC methane module is focusing on methane monitoring at seasonal intervals. The Hamilton team is on the



Bull fitted with

home run with their first methane collections from steers for spring. The collection process was run for approximately three weeks and concluded in mid-November. The team has collected two runs of samples from eight steers, and has monitored for faeces, methane, feed intake and alkanes. On top of this run, the team has also collected samples from a further 8 steers, bringing their total spring measurements to 16 steers.

methane collar at Hamilton

Blessed with a late spring, the Hamilton team has had optimum conditions for collecting their samples. The sampling process has run far better than expected, and once collection has finished, samples will be sent to Ellinbank for alkane analysis. While no technical problems have been encountered, there have been occasional difficulties in obtaining twice-daily faeces samples from the participating steers. The steers have not always been "forthcoming" and as one team member commented: "It's like extracting blood from a stone"!

The Ellinbank methane team has just commenced its spring run of methane monitoring with permeation tubes (slow release tracer gas capsules) having recently been inserted into eight dairy cows. After considerable experimentation with the construction of permeation tubes, the tubes are now being sourced from Keith Lassey from NIWA, New Zealand. This option is proving to be cheaper and more efficient.

Assisting with methane monitoring, the Ellinbank team is currently hosting an undergraduate student from the University of Melbourne (Dookie campus), Glenn Mitchard. Glenn is using the current spring monitoring run as the basis for his third year research project.

Having invested considerable energy into refining the SF₆ technique more locally, the Ellinbank team was pleased with the outcomes of the 2nd Joint Australia and New Zealand Forum on Non-CO₂ Greenhouse Gas Emissions from Agriculture where progress was made towards the creation of standard protocols for the technique across all research groups.

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*Mick Meyer with a
chamber controller at
the Griffith site*

CRC-F1, Grains Module, Griffith Site

by Mick Meyer, CSIRO Atmospheric Research

The CRC grains module has secured a multi-block flood-irrigated maize site near Griffith and is set to commence its first full year of emission measurements in April 2004. Originally set up by Clive Kirkby of CSIRO Land and Water, this multi-blocked site was designed to look at the effects of maize double management on yield, soil properties and carbon. The different fertilisers and treatments used at this site make it ideal for looking at greenhouse emissions.

The proposed experiment is part of a larger study that will involve a full life cycle analysis of maize production. The study will look at emissions through the overall supply chain from on-farm activities through to the end user, or consumer. A range of different product options will be considered, one of these being corn chips. With the exception of similar experiments undertaken by Keith Weir (sugarcane) and Peter Grace (see cotton section below), this study is the first of such an intensely irrigated and fertilised crop undertaken in Australia.

Focusing on on-farm emissions, the experiment will look at three effects:

- * A control consisting of normal fertiliser application (300kg of Nitrogen/hectare) and stubble burnt;
- * The effects of stubble retention with 300kg of Nitrogen/hectare and stubble incorporated, and
- * the effects of no fertiliser and double burning.

The experiment will use the same chamber technology as developed for the Rutherglen and Kyabram sites, and these will be functioning in-field by early March 2004. Emission data will be used to extend a number of different GIS and other models.

Members of the Griffith research team include Deli Chen and his team from the University of Melbourne, as well as Ying Ping Wang, Ian Galbally, Ian Weeks, Sarah Lawson, Tim Grant and Mick Meyer all from CSIRO Centre for Atmospheric Research (CAR). Co-funded by the GRDC and the Australian Greenhouse Office, the project is being managed by Tom Beer (CAR) and supported through industry by Kim Russell.

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CRC-PROJECT F2: Farming Systems to Reduce Non-CO2 Greenhouse Gas Emissions

by Richard Eckard, Project Leader

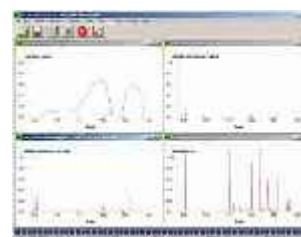
This CRC project aims to use the data from the F1 project sites to refine models that will be used to develop and rigorously evaluate new best management practices in a whole-of-farm systems context.

Daniel Rodriguez, Richard Eckard and Yong Li are currently reviewing a range of models capable of predicting nitrous oxide from cropping and intensive grazing systems. The models under review include the Decomposition model (DNDC), the Water and Nitrogen Management model (WNMM), DairyMod/EcoMod and Daycent.

The F2 team presented a number of abstracts and posters at the 2nd Joint Australia and New Zealand Forum on Non-CO2 Greenhouse Gas Emissions from Agriculture. The F2 team also participated in a workshop at the forum discussing modelling requirements between Australia and New Zealand with a view to developing common protocols for data storage and exchange.

Following the forum the F2 team has worked towards developing a standard format for the storage of modelling datasets, aimed at improving the ease of sharing our data with other groups around the world, but also testing the robustness of a range of models on a range of similar datasets.

The DairyMod/EcoMod model was recently subjected to 2 days of rigorous evaluation and testing by the National Dairy Farming Systems team; a targeted group of end-users. This team ran the model against their actual farming systems projects, with sites ranging from Queensland to Western Australia. At this workshop Richard Eckard presented a comparison of a 40 year simulation of the nitrogen cycle, against actual data from the recent experimental site at Ellinbank. This evaluation has provided confidence that, once parameterised for a site, this model can be



A screen-shot of the WNMM model

used to evaluate the impact of a range of nitrogen management practices under intensive grazing systems.

A recent edition of GRDC's GroundCover magazine highlighted the DAV00007 project lead by Daniel Rodriguez. This publication is distributed to 50,000 people in the grains industry across Australia, and will ensure broad exposure of this work.

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Screen shot of the Dairy Greenhouse Accounting spreadsheet available from our web site

CRC-PROJECT E3: Partnerships, Education and Communications in Agriculture

Traci Griffin, Project Leader

Following consultation with the Industry Liaison Panel, the CRC Project E3 Leader position was advertised and interviews will be held in the first week of December. We expect an appointment by the end of the year.

GCCA Evaluation & Communication Module:

As an assurance that GCCA communications are well on track, Sue Kiernan of the evaluation and communication module was recently awarded the PIRVic/DPI Leadership award in recognition of her driving force behind the multi-campus communications model (for more information on this model see newsletter no.1). The innovative nature of Sue's model has caught the attention of senior DPI staff members who have invited Sue to extend this model to other industry and project areas. Congratulations to Sue for all her hard work and innovation!

Over the past quarter, evaluation and communication efforts have focused on the redevelopment of action plans for both functions. This has included the formalisation of the outcomes of the multi-campus communications workshop held in July 2004, as well as a review of evaluation activities conducted by Jessica Dart, an independent evaluation consultant.

Notable findings from GCCA evaluation and communication activities so far include:

Overall, there has been an increasing number and diversity of awareness raising activities since December 2002. This includes approximately 19 appearances in popular newspapers, television and radio segments over the past six months.

Increasing energy is being invested in communication activities targeted towards community and farmer groups. Observational data suggests that farmers are interested in the GCCA project, and there is a perception that the project is worthwhile.

Anecdotal evidence suggests that funders are content with the progress of the project. Unsolicited feedback has been positive and the project has been congratulated on the initiative taken to raise awareness amongst stakeholders.

Communication journals maintained by all research modules indicate that collaborative relationships are gaining strength

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