

# INNOVATION

**UNE**  
UNIVERSITY OF  
NEW ENGLAND



NSW DEPARTMENT OF  
PRIMARY INDUSTRIES

## News from the Primary Industries Innovation Centre

**No. 2: June 2009**

### Launch of the National Centre for Rural Greenhouse Gas Research

Minister for Primary Industries Ian Macdonald announced the appointment of Professor Annette Cowie as the inaugural Director of the new National Centre for Rural Greenhouse Gas Research (NCRGGR) at UNE on 25<sup>th</sup> May. The Minister said "Professor Cowie has strong credentials to direct the centre's future research, she is an international expert in greenhouse gas systems and has explored in-depth the opportunities for rural industries from emissions trading". "Professor Cowie's experience as a senior research scientist with NSW DPI, along with her strong leadership skills, stand her in good stead for this role."



The official party at the launch included from left to right UNE Vice Chancellor Professor Alan Pettigrew, Professor Annette Cowie, NSW Minister for Primary Industries Ian Macdonald and UNE Chancellor Richard Torbay. Professor Cowie said the Centre would aim at a "whole systems approach" to the task of reducing greenhouse gas emissions. She said that approach would draw on the work of researchers in fundamental areas of science from throughout the University and NSW DPI.

The centre is part of PIIC and is a joint venture between the NSW DPI and the University of New England. The initial focus of NCRGGR will be on reducing greenhouse emissions from agriculture, sequestering carbon in soils and developing next generation biofuels. The Centre has already attracted more than \$7 million for funded research projects over the next three years. The projects

will provide practical management solutions to farmers, foresters and industries. The centre's projects include the following:

- DPI scientists Dr Robert Herd, Dr Roger Hegarty and Kath Donoghue have secured \$1.58 million in funding from the Federal Government's Climate Change Research Program to study genetic variation in beef cattle herds and techniques to reduce methane production in ruminants. Meat and Livestock Australia is supplementing these studies with a further \$120,000
- A project to assess the potential to sequester carbon in agricultural systems in NSW has received \$1.05 million over three years through the Federal Department of Agriculture, Forestry and Fisheries' Soil Carbon Research Program. This project also received \$400,000 in funding from the Grains Research & Development Corporation (GRDC).
- The centre's climate change research program will investigate options for mitigating nitrous oxide emissions from cropping soils in North-West NSW. The project will receive \$450,000 in funding from GRDC.
- The centre's growing reputation has already attracted six new PhD students, bringing an additional \$540,000 to the centre.

### PIIC sponsor at 1st Asia Pacific Biochar Conference



PIIC was a platinum sponsor of the 1st Asia Pacific Biochar Conference held at Surfers Paradise from 17th to 20 May. As a sponsor Bob Martin had the opportunity to make a presentation to the conference on the activities of the National

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Centre for Rural Greenhouse Gas Research. Annette Cowie, Lukas van Zwieten and Steve Kimber (NSW DPI) were on the organising committee for the conference. Annette also gave a keynote presentation on “greenhouse gas mitigation benefits of biochar as a soil amendment”.

NSW DPI contributors to the conference included Dr Malem McLeod (Tamworth), Dr Bhupinderpal Singh (Pennant Hills), Dr Lukas van Zwieten (Wollongbar), Dr Katrina Sinclair (Wollongbar) and Mr Steve Kimber (Wollongbar). Conference presentations and information about biochar is available at [www.anzbiochar.org](http://www.anzbiochar.org).

### Nitrous oxide project gets underway

Field work has commenced at the Tamworth Agricultural Research Institute to investigate the mitigation of nitrous oxide emissions from soils using pulses and improved fertiliser management. The project is funded by the Grains R&D Corporation as part of the National Climate Change Research Program.



NSW DPI's Dr Graeme Schwenke (centre right) and UNE's Dr Chris Guppy (centre left) explain the operation of chambers for the continuous monitoring of nitrous oxide emissions from soil. Looking on are PhD student Nazma Begum (left) and Professor David Herridge (rear).

Use of fertiliser N in the agricultural sector accounts for 32% of Australian N<sub>2</sub>O emissions. Of the 1 million tonnes fertiliser N used annually in this sector, approximately 70% is applied to cereals. This project will investigate the potential to mitigate emissions in cereal production systems of the north-west NSW slopes and plains through partial substitution of fertiliser N inputs with biologically-fixed legume N - an N source that is likely to be less subject to direct N<sub>2</sub>O emissions due to its slow release nature. Indirect emissions through manufacture and transport of fertiliser N will also be saved by increased use of biologically fixed N. The project also aims to develop real-world multiplier factors to replace IPCC default values used in calculating GHG emissions from fertiliser and legume use for NSW and Australia.

### Welcome Professor David Herridge



Professor David Herridge (pictured) has joined UNE after a distinguished career in soil biology with NSW DPI. David will manage a number of soil productivity projects within PIIC.

David is well placed to enhance collaboration and research relationships at a national level between

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government and industry partners, the NSW DPI and the University of New England.

David's current project involvements include:

- ACIAR SMCN-2006-013 – 'Increasing food security and farmer livelihoods through enhanced legume cultivation in the Central Dry Zone of Myanmar'.
- GRDC – Nitrogen and legumes in farming systems: a compendium and interactive excel-based packages for improved nitrogen management.
- GRDC – 'Mitigating N<sub>2</sub>O emissions in rainfed and irrigated farming systems through N<sub>2</sub>-fixing legumes and precision sowing technology'.

Professor Herridge will also coordinate the GRDC Next Generation Beneficial Microbes Collaborative Research and Development program. This program seeks to identify new approaches and technologies that will provide beneficial microbial products for Australian farmers.

### Crop profit groups for Cambodian farmers

The Australian Centre for International Agricultural Research (ACIAR) is providing \$1,169,040 over three years for the project "Enhancing production and marketing of maize and soybean in north-western Cambodia and production of summer crops in north-eastern Australia".

Bob Martin is the project leader and collaborating institutions include the NSW Department of Primary Industries, University of Canberra, University of Melbourne, CSIRO Sustainable Ecosystems, Cambodian Agricultural Research and Development Institute, Maddox Jolie-Pitt Foundation, CARE Cambodia, and the Cambodian Ministry of Commerce.

A participatory action research (PAR) approach is being used that is focussed on activities BY the local people and FOR the local people. The research is designed to address specific issues identified by local people, combined with outside knowledge provided by the researchers and the results are directly applied to the problems at hand. The Continuous Improvement and Innovation (CI&I) approach is being used to set timeframes, performance targets and processes

to ensure that improvements are sustained beyond the life of the project.

Crop Profit Groups have now been set up in 8 village clusters in Pailin Municipality and Samlaut District in north-western Cambodia. In June 2009 farmers attended field days on project trial sites in the 8 clusters and participated in workshops, convened by Dr Bob Farquharson (University of Melbourne) to discuss the farming technologies that were demonstrated. The farmers provided input about the economic and social advantages and disadvantages of the new technologies and discussed the possibilities for changing their farming practices.

Partial budgeting was used in the workshops to compare the farmer practice with the proposed change from adoption of an improved practice.



Cambodian farmers (above) were enthusiastic participants in the exercise and provided estimates of crop yields and prices. One farmer wanted to know what would be the result of replacing some of his maize planting with soybean. The partial budget analysis indicated that he would make about \$100/ha more with the soybean compared to maize. In another scenario, addition of rhizobium inoculum to legume seed would give an increase of \$329/ha.

### PIIC hosts John Dillon Visiting Fellows

PIIC was host to John Dillon Visiting Fellows Dr Marsetyo, Mr William Kerua and Mr Chea Sareth on 29-31 March. Dr Marsetyo is Senior Lecturer, Department of Animal Science, University of Tadulako, Sulawesi Tengah, Indonesia. Sareth is Deputy Head of the Socio-Economics and Science Division at the Cambodian Agricultural Research and Development Institute in Phnom

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Penh. William is Lecturer at the PNG University of Technology, Lae, Papua New Guinea.

The John Dillon Memorial Fellowship has been established by the Australian Centre of International Research (ACIAR) in recognition of Professor John L. Dillon's life-long support for international agricultural research. The Fellowship scheme serves the memory of John Dillon by providing career development opportunities for outstanding young agricultural scientists or economists from ACIAR partner countries who are involved in a current or recently completed ACIAR project. Four to six Fellowships are offered annually.



Grazier Don Tully (right) explains the transition from superfine merinos to fattening steers at 'Tarangower' to Dillon Visiting Fellows William Karua, Chea Sareth and Marsetyo (from left to right).

William, Sareth and Marsetyo visited DPI's Tamworth Agricultural Institute where they met with Economist Fiona Scott, Soil Scientists Dr David Herridge, Dr Graeme Schwenke and Dr Malem McLeod and Extension Agronomist Loretta Serafin. At UNE the visitors met with Economists Emeritus Professor Roley Piggott, Professor Euan Fleming and Associate Professor Oscar Cacho.

### North West NSW Organic Materials Audit

Mary Kovac (above right), Resource Management Officer with NSW DPI at Dubbo, has commenced an audit of organic bi-product materials in the North West region of NSW. Andrew Scott, her counterpart from Tamworth is also assisting in the work.

The audit which is expected to be completed by August 2009, includes all major sources of organic materials such as crop residues, forestry and sawmill residues, intensive livestock wastes, woody weeds, and municipal wastes.



The project advisory group includes Prof. Bob Martin (PIIC), Brendan George (DPI), Ian Kruger (DPI), Dr Malem McLeod (DPI), Rex Glencross-Grant (UNE), Kate Newlan (Program coordinator, Northern Inland Regional Waste Group) and John Davis (Manager, Northern Inland Regional Waste Group).

Organic materials can be used to produce bioenergy and biofuel as substitutes for traditional fossil fuels and therefore reduce greenhouse gas emissions. Co-products of some of energy production processes (eg biochar, which contains high proportion of stable carbon) can potentially be used as offsets for greenhouse gas emissions as well as a soil amendment to improve agricultural production.

Before studying the feasibility of any future bioenergy production plants in the North West, a better understanding of feedstocks is necessary. This audit will provide preliminary information on the volumes, availability, costs and the reliability of supply of each organic feedstock. It will also yield a better understanding of potential sites for bioenergy plants based on transport logistics, access to water and access to the power grid.

Many organic materials are commonly known as 'wastes', but most have economic values and existing uses that need to be taken into account. For example, crop residues left in the field reduce soil temperature and increase soil moisture

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storage and therefore provide resilience against climate variability and climate change. Organic materials left *in situ* or livestock manures spread on agricultural land could increase the potential for carbon storage in soil.

The audit will provide baseline data required for modelling of options for the best use of organic material streams for mitigation of greenhouse gas emissions. A limited number of case studies will be prepared which identify potential issues and conflicts over alternative uses of organic 'wastes'.

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