

# Cross-Institute Programme for Sustainable Soil Function

## SoilCIP

Newsletter for September 2008



### PhD proposals to start in 2009

I have received a call for PhD proposals for students to start in 2009. These are to be submitted on the standard form via Centre Heads, who will make the first sift. I suspect that Brian will ask Juliet Osborne and me to help; Angela Karp is also eager for proposals coming from her Centre for Bioenergy and Climate Change. Large Centres such as ours will be able to advertise 4/5 studentships. We are asked to note:

1. Rothamsted has an allocation of 19 studentships to start over three years (2009, 2010, 2011) so we have flexibility in allocation.
2. The aim is to allocate up to 3 studentships:
  - i. to match BBSRC support
  - ii. for strategically important topics in areas where recruitment is difficult (e.g. bioinformatics, some aspects of plant science).These will be released if not filled within 18 months. Recruitment to such studentships would need to meet the usual standards.
3. Only 25% of the studentships are required to be CASE, compared with 50% in the past. We will therefore consider CASE and standard proposals in competition, making appropriate allowances for the constraints on the scientific content of CASE proposals.

Any ideas to me, please in the first instance.

### Cross-Institute visits and links to North Wyke

Marta Alfaro from INIA (Instituto de Investigaciones Agropecuarias), Remehue (Osorno), Chile will be visiting North Wyke in September. She is a partner with David Hatch and Laura Cardenas in the project on nitrification inhibition in volcanic soils, funded by the Royal Society. More details of INIA (in Spanish) at:

<http://www.inia.cl/link.cgi/>

Ian Reent from Klaus Ditter's group in Kiel, Germany is working with Sreenivas Rao-ravella and Laura on the effect of biofuel waste application to land on N<sub>2</sub>O emissions

(laboratory scale). Biofuel is a high-value renewable energy source suited to producing electricity and heat as well as an engine fuel. However, to ensure that the production of biofuel does not contribute to climate change we need to know if the application to land of fermentation residues causes the emission of greenhouse gases. Previous experiments conducted in Kiel indicated that, during the initial period after field application of biofuel waste the emission of N<sub>2</sub>O was surprisingly low compared to mineral N fertilizer. The team are using the DENIS system to measure the impacts of fertiliser and biofuel waste on fluxes of N<sub>2</sub>O, N<sub>2</sub>, CH<sub>4</sub> and CO<sub>2</sub> (and DOC if possible) under controlled moisture conditions. They are also distinguishing between nitrification and denitrification by pre-spiking the soil with <sup>15</sup>NO<sub>3</sub> and analysing the N<sub>2</sub>O and N<sub>2</sub> by IRMS and using molecular methods to examine the fermentation process.

### **British Society of Soil Science (BSSS) autumn meeting**

The SoilCIP hosted a one-day meeting of BSSS at Rothamsted on 17<sup>th</sup> September entitled: 'Something old, something new: integrating molecular biology with other techniques in soil science'. The keynote paper was given by Penny Hirsch and there were papers from Ian Clark and Kit Macleod. A discussion of 'The relative merits of molecular biology and other approaches to studying contemporary soil problems.' Concluded the meeting. Patricia Bruneau of Scottish Natural Heritage has written a report for the BSSS Newsletter, saving me the time:

### **The British Society of Soil Science 2008 autumn meeting**

Dr. Patricia Bruneau

The British Society of Soil Science (BSSS) autumn meeting was hosted by the Cross-Institute Programme for Sustainable Soil Function (SoilCIP) at Rothamsted Research (Harpenden) on the 17 September 2008. The topic of this year's meeting was "Something old, Something New - Integrating Molecular Biology with other techniques in soil science". The meeting was chaired by Professor Keith Goulding (Manager of the SoilCIP and Head of Soil Science at Rothamsted) and attracted over 50 participants from across the UK.

The purpose of the meeting was to discuss the current state of molecular-level soil research and generate a discussion on the relative merits of molecular biology and other approaches to studying contemporary soil problems. The meeting programme and the abstracts of oral presentations are available for download from the society's web pages.

Opening the meeting, Dr Penny Hirsch, emphasised that soil quality is sustained by microbial communities, which are vast, diverse, and which she considers largely undescribed. Since the relationship between the size, diversity and activity of microbial populations and soil 'quality' is unclear, it is currently difficult to predict the effects on these of changes in land use and management and the spatio-temporal scale at which they vary. She emphasised that some functions undertaken by specific microbial groups, measured *in situ*, may indicate the size of the active population but cannot describe its diversity or any related, inactive microbes. A major role for microbiologists is testing the hypothesis that genetically diverse populations are essential for resilience to perturbations in key soil functions such as nutrient cycling and organic pollutant degradation in a changing environment.

The meeting's presentations and discussions established that, although it is now relatively easy and cheap to measure abundance of groups or phyla, this information may not directly relate to community activities nor does it directly link with above ground vegetation and environmental processes.

In the both sessions, the various oral and poster presentations re-emphasised that no single approach can give a full picture of soil quality (abundance and functionality). Throughout the meeting it was clear that combinations of molecular techniques are essential to describe soil biodiversity. In the quest for such biological indicators, we should recognise that there is currently no technique or set of techniques for long term monitoring because temporal variability of microbial communities is a serious limitation to yearly monitoring.

In the final discussion session, the technique of PLFA was described as a robust tool for discriminating between site and context but less efficient to measure change in given communities; BIOLOG<sup>®</sup> came in for much criticism. New methods such as microarray and high through-put sequencing should enable better surveys of soil biodiversity abundance, soil biodiversity activities and diversity in the future. Such an approach appears essential if we wish to understand the interactions between land use changes and the provision of ecological good and services. There is a need to link techniques to answer broad ecological questions, but still many unknowns on how the results collected will relate to ecosystem functions. Moreover, consideration on climate change impacts will also require assessing not just the abundance of species but their functionality.

## **EUROSOIL 2008**

Seven SoilCIP staff attended Eurosoil 2008. Andy Whitmore, Murray Lark, Andy Gregory, and Carolin Cordova gave oral papers. Main highlights of the conference are at:

<http://www.ecsss.net/web/frontend/view.php?MENUID=230>

The conference passed a motion to support the EU Framework Directive on soils:

Soil is a vital, non-renewable resource, providing essential goods and services to human-life and ecosystems. For instance, soil plays a major role in climate change, food, fiber and energy supply, water regulation, biodiversity, and human health. Therefore, it is essential to maintain and preserve the soil functions for the sustainable development of our societies.

Long-term soil sustainability is endangered by numerous threats that have been listed in the proposal of a European directive for soil protection.

The over 1500 participants of the EUROSOIL congress held in Vienna (August 25-29, 2008), soil scientists from 77 countries, including the representatives of the 43 European national soil science societies, consider that a unique legal and political framework for soil protection is an absolute necessity to preserve soil resource at the European level.

We therefore urge the French Presidency to resume the discussions aiming to reach a political agreement in the Environmental Council on 20 October. We request the 5 Member States that could not agree with the Portuguese Compromise text on 20 December 2007 to reconsider their position for the sake of preserving this precious natural resource

Dr. Roland Poss

Président de l'Association Française pour l'Etude du Sol

IRD, SupAgro Bt 12, 2 place Viala, 34060 Montpellier cedex 1, France

The venue for EUROSIL 2012 will be Bari in Italy.

### **National Geographic – cover story on soils**

The September issue of the National Geographic Magazine has a cover story on soils, entitled: Where food begins. Inside the magazine there is a long article: “Our Good Earth - The future rests on soil. Can we protect it?” with stories from North and South America, Africa and China and as always, with good photos. There is also story on soil degradation in Haiti. Both the article and pictures can be viewed online for free at [www.nationalgeographic.com](http://www.nationalgeographic.com). The website contains an interactive quiz, click [here](#). The English edition of the National Geographic is read by 40 million readers – but there are editions in many languages and all have the soil story on the cover!

Keith Goulding, 1<sup>st</sup> October 2008