

# Biological Diversity and Ecosystem Function in Soil

## Soil Biodiversity

NERC Thematic Programme



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### Six months to the Millennium... and the programme gets under way.

*All the awards have been sorted, some studentships started and the work is definitely beginning. The following report is by Janie Pryce-Miller, a PhD student based at ITE Merlewood, who is part of Clare Robinsons team.*

The soil mycologists have started! In January I, a CASE student at King's College London, and supervisors braved arctic conditions at Sourhope (-15°C, with the wind chill factor) to sample decomposer soil fungi and to test out the methods to be used after D-day. Pits were dug alongside the Rigg Foot experimental area and, for comparison, in a *Nardus*-dominated site guaranteed by Sourhope staff not to have been 'improved' in living memory, conveniently close to the laboratory. Soil profiles were prepared and samples taken aseptically from the litter, fermentation, humus and mineral horizons for fungal isolations at Merlewood Research Station. Experiments were then run to determine the most appropriate culturing conditions for determining the species present and their relative abundance. The cultures produced a picture of two typical grassland fungal communities with several readily

identifiable species. There were some differences in species diversity and occurrence at different depths, but little difference in the number of species on the two sites.

The aim when the lime and nitrogen treated plots are sampled will be to select key species with regard to abundance and function, and to detect them *in situ* with gene probes. Rarer species with similar functions will be compared with them in a study of species 'redundancy' and selection processes within the ecosystem. How these fungal communities change over the next three years after the fertilisers have been applied will also be examined.

The investigation of the last two months, with data now being analysed, should give us a head-start for the real thing.

Janie Pryce-Miller



Juliet Frankland samples a soil profile assisted by Brian and Margaret Bainbridge and Janie Pryce-Miller. Photos: Clare Robinson

Website: <http://mwnta.nmw.ac.uk/soilbio>

## SOIL BIODIVERSITY MEDIA LAUNCH - Edinburgh 7th April 1999



Amid the hubbub of the International Science Festival in the Edinburgh Assembly Rooms the programme held its press briefing to a select group of journalists. In attendance were the Chairman, Michael Usher,

nematologist Mark Blaxter, microbiologist Ute Skiba and pedologist expert Donald Davidson. All were there to add a Scottish flavour to the presentation. The press coverage was accurate and included the Daily Telegraph, Daily Mail and Herald newspapers. In addition, local radio stations and regional press covered the individual awards. Thanks go to those who turned out on the day, to Ursula Edmunds of NERC Communications and Pauline Mullen of the Science Festival Press Office. Please let the Programme Office know of any other media coverage resulting from this launch or from future activities.

Richard Scott



## LINKS TO THE USA SOIL BIODIVERSITY PROGRAMME

*Professor Michael Usher visited the Natural Resource Ecology Laboratory, Fort Collins, Colorado, from 17th to 20th March 1999 on his way back from a conference in California. This edited report picks up a few points that emerged from his two days of discussion.*

### KANSAS FIELD SAMPLING

Interestingly, rather than repeated sampling, the North Americans are planning a 'big bang' sampling approach. The sampling week is, therefore, a very important week in their lives! They are hoping that more progress can be made with the C3/C4 experimental work.

On my return to the UK I e-mailed all of the UK PIs with details about the field sampling week that is being planned for Konza, Kansas, starting on Monday, 17th May 1999. The USA group would clearly value a small British contingent at Kansas because all members of the USA (and Canada) research team will be present at Konza. Phil Murray and Richard Bardgett have responded to the invitation.

### COLLABORATION

Modelling remains a unresolved area, especially as a co-PI in the USA is a modeller and as we still do not have an explicit modelling component to the UK programme. Bill Hunt has a complex ecosystem model, developed over the years following the IBP research on the short-grass prairie (Konza is a tall-grass prairie site). We discussed aspects of his modelling approach and whether simplification (ie

fewer boxes) or extension (ie more boxes) could be used to mimic the effect of decreasing/increasing biodiversity in the soil.

Diana Wall strongly supports the concept of a BES symposium on 'Biodiversity in Soils' in 2004. We feel that the timing is just right to air the results of the research programmes in the UK, USA, Australia, and France, etc, if their own programmes on soil biodiversity have results to report. We should, therefore, like to see Richard Scott, with appropriate PI/Steering Committee and other support, developing a proposal on these lines for the BES. It is possible that the ESA may wish to join in supporting such a conference.

### BROADENING THE SCOPE IN THE USA

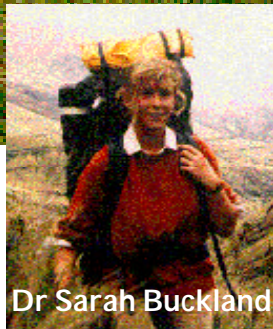
The scope of the USA research programme is much narrower than the UK programme. In Konza attention is focused on multi-cellular soil animals (essentially nematodes, mites and Collembola). This makes modelling of the whole system difficult because there will be a paucity of data on many important ecosystem components, eg micro-organisms, fungi, protozoa, etc. The US group is attempting to undertake a limited amount of research, more of a 'look and see' kind because of lack of funding, but they are clearly excited about the way that the UK programme is covering the breadth of soil biodiversity.

Michael B Usher

## SOURHOPE SITE MANAGER



### Soil Biodiversity Experiment Site Manager



I have just been appointed Field Experiment Manager at Sourhope Research Station and have been asked to introduce myself to you. I began my postgraduate research, in January 1990, in the Unit of Comparative Plant Ecology, at the University of Sheffield. A large proportion of my time was spent at what is now called the Buxton Climate Change Impacts Laboratory. In those early

days it was exciting to see the site develop as a wide range of experiments became established. More recently, I have worked with both plants and animals, (soon to be extended on the microscale!), investigating 'top-down' control of herbivores by carnivores, at different soil fertilities. It has been interesting to see radical changes in the vegetation resulting from differences in both nutrient status and trophic interactions.



I hope these experiences will prove to be a good preparation for working with the experts involved in the Soil Biodiversity research programme. I hope too, that I manage to provide good co-ordination between the different projects and succeed in keeping everyone happy. Please can scientists visiting Sourhope let me know how I can assist them, either in helping them prior to, or during their stay. With the onset of spring I'm looking forward to an adventure in the Borders.

Sarah Buckland

## EXPERTS TALK ON SOIL MICROBIOLOGY *(as seen by David Hopkins on his New Zealand sabbatical)*

In recent weeks the NERC communications office and the Press Offices of individual Universities and Institutes have ensured that soil biology has featured in the national and the local media. Normally in Britain articles on soil microbiology in the newspapers are rare and it would be tempting to believe that more items would be welcome, but would they? Reproduced below is the text of an item that appeared on the news pages of the Christchurch (New Zealand) Press newspaper (27 August 1998).

### EXPERTS TALK ON SOIL MICROBIOLOGY

**An Australian expert in soil microbiology is holding three South Island seminars next week on ways to improve soil health.**

**Frank McKenna, of the natural science centre, Perth, has developed a product called SC27, which adds the microbial life needed to activate nutrient availability. Most soils are deficient in microbes because of cultivation, compaction, drought, flood, mono-cropping, long-fallow, and chemicals.**

**Stan Winter, of Southern Chemicals Laboratories, Invercargill, has developed a test to show if soil has enough microbes for efficient nutrient cycling. The pair will speak at the Commodore Hotel, Christchurch, on September 3; and the Ascot Park [not Silwood Park near Ascot] Hotel, Invercargill, on September 4.**

Rarely is the link between soil biodiversity and ecosystem function so firmly made. Of course most of the readers of this article will, it is hoped, see through the implied claim that loss of function is the result of a deficiency of microorganisms that can be remedied simply by addition of organisms without ameliorating soil conditions. Perhaps the editors of the Soil Biodiversity Newsletter could consider a "no comment" column for this type of article. However, in the interests of good relations in a community programme and self-preservation, I suggest articles appearing in the scientific literature should be excluded.

David Hopkins

## COLLABORATION AROUND THE GLOBE

The programme office has been contacted by various other programmes around the globe. As well as the USA programme (featured on page 2) and the Australian links at CSIRO, a number of messages are being received including one from Zarreen Mirza, a Research Associate with the United Nations Development Programme (UNDP) Sub-Regional Resource Facility for South Asia, located in Islamabad, Pakistan, support to UNDP Country Offices in the region.

UNDP is currently seeking to have a soil biodiversity project under implementation before the end of 1999 and is trying to identify some specialised institutes and work with them to look at strategies and formulate a modest programme of support. The subject of Soil Biodiversity is clearly being recognised as a vital field of study in support of farming and forestry development.

Any one with a potential interest, please contact the Soil Biodiversity Office, from where details can be passed on.

## Accommodation at Sourhope

For those of you wanting to make the most of your stay at Sourhope whilst conducting your site visits and sampling, there is self-catering hostel accommodation for up to 9 persons in the Old Sourhope farmhouse. The current cost is £8.75 per night, which includes heating, lighting and bed linen.

The laboratories in the office complex will also be made available upon request to the Site Experiment Manager, Dr Sarah Buckland. One laboratory contains benching, water, sinks and electricity sockets. The other field lab contains benching, large and small ovens, a fridge and larger freezer facilities. In the office complex there are telephones, fax and network facilities.

Please remember to fill in a Site Visit Registration Form (available on the WWW site below) and complete and return this before your visit.

A set of baseline samples taken by Helaina Black, on 3rd March 1999 were sent to Hefin Jones and analysed by Dr Heikke Setala, University of Jyvaskyla, Finland, one of the Ecotron's British Council Collaborators.

The analysis so far is:

*"The enchytraeids are VERY abundant at Sourhope, the mean number of individuals being 138 000/m<sup>2</sup>. (standard deviation ca. 35 000).*

*This means that the site is the most enchytraeid rich one I've ever encountered!*

*About 95% of the individuals are Cognettia sphagnetorum, ca. 4% are two species of Fredericia, and the rest are Bucholzia sp. So, 4 taxa thus far (I have checked about one third of the samples)."*

## Best Captions for Konza Soil

'If only we could catch and train just one of these moles the jubilee line would surely be finished for the Millennium'

**Grahame Hall, IFE**

"Talk about biodiversity .... you should see the size of the moles round here!

**Steve Chapman, MLURI**

## A LITTLE BIT OF KONZA 2

The soil from Konza has made its Atlantic crossing via Felixstowe, having gone through all the necessary customs papers, and has now found a resting place at Merlewood, waiting for its trip to Sourhope.



## DATES FOR THE DIARY

**28 June 1999 - Steering Committee meeting at MRC, London.**

**10/11 November 1999 - Award Holders Meeting to be held at The Grange Hotel, Grange-over-Sands, Cumbria.**

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