

Australian Soil Club

Welcome

The main articles in this issue are:

- *National Conference on Soil Science*
- *Healthy soils initiatives*
 - *for the northern rivers NSW*
 - *for the vegetable industry*

FEATURED WEBSITE

Western Australian Department of Agriculture and Food

<http://www.agric.wa.gov.au>

A recent addition to this website is the 'Farming for the Future' sustainability program.

The program has three levels certification for farmers in Western Australia. Level 1 certification is a self assessment process. A comprehensive document can be downloaded from this website. When completed, it is submitted to the WA Department of Agriculture and Food for review. A satisfactory level of compliance is acknowledged with a Certificate. It is an annual process and ongoing compliance with sustainable practices is acknowledged based on a new submission each year. Levels 2 and 3 cover more formal participation in accreditation programs which meet sustainability requirements accepted by the Department of Agriculture and Food in WA.

For further information about the Australian Soil Club, contact:

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Combined National Conference on Soils Adelaide, December 2006

A National Soils Conference, held at The University of Adelaide in December was a resounding success in highlighting the importance of soil science to solving current and emerging problems. The conference was a collaboration of the **Australian Society of Soil Science**, **The Australasian Soil and Plant Analysis Council** and the **Australian Clay Minerals Society**. Each of these organisations plays an important role in investigating soil related issues that support sound decision-making. Many aspects of our society - including food production, housing developments in existing and future urban landscapes, road building, forensic science, land reclamation and waste disposal all depend on knowledge of soil.

Topics at the conference included studies of salinity and salt-affected areas, use of geographical information systems to display and interpret soil information, reclamation of degraded land, soil organic matter, waste disposal and solutions to contaminated soils, acid sulphate soils, mobility of soil constituents including pesticides and nutrients, climate change and communication of soil science.

Further information is available on the ASSSI website www.asssi.asn.au

While many of the presentations at the conference were technical, the practical relevance of the information was generally well explained. Solutions to national and international problems related to soil science extend well beyond the knowledge-base of soil scientists, but soil scientists are very willing to collaborate in working towards solutions. The sections of the conference on communication in soil science demonstrated the skills of enthusiastic soil scientists in developing packages and programs to highlight both specific information about soils and other information which is of more general interest.

The following is an example of topics covered in the poster presentations at the conference: (i) subsoil constraints reduce crop production in the high rainfall zone of south eastern Australia, (ii) efficiency of nitrogen fertilisers is possible through the use of inhibitors of nitrification, (iii) there are emerging nutritional issues for cropping on the Liverpool Plains in northwestern NSW, (iv) innovative nitrogen fertiliser management is available for sugarcane production, (v) advances have been made in the repair and rehabilitation of tunnel erosion in Tasmania, (vi) drying and wetting cycles in soil change soil phosphorus, carbon and microbial biomass, (vii) drainage of Vertisols affects soil structure and has implications for land management, (viii) economic returns are available from monitoring and remediation of acid soils with lime application in Western Australia, and (ix) forensic soil science can be used to inspire the next generation of soil scientists.

KEYNOTE PRESENTATIONS NATIONAL SOILS CONFERENCE

Problem Soils in Australia - How Soil Science is Helping to Solve Them

Mr George Rayment

Queensland Department of Natural Resources and Water.

In his keynote presentation the soils conference, George Rayment highlighted problems such as the importance of finding suitable clay for cricket pitches to ensure they enable the ball to bounce the right way, how nutrient rich sediment losses are threatening parts of the Great Barrier Reef, and the increasing risks of exposure of acid sulphate soils during urban development. Salinity, soil acidification and excessive nutrient loads in some agricultural soils also pose serious problems for soil scientists and others in the community. Increasingly, soils are expected to hold the solutions to serious issues such as global warming though their potential to sequester carbon and produce healthy food grown in uncontaminated soil. Therefore, there is a serious need for the soil science community to engage in research and community decision-making on these and other important topics.

New Considerations and Tools in the Management of Saline Soils

Dr Donald Suarez

US Salinity Laboratory, USDA-ARS, Riverside, California

Don Suarez addressed the suitability of irrigation water and problems associated with sodicity using research from the USA. The widespread use of groundwater for irrigation and its long-term consequences is also an important issue in Australian agriculture. The interplay between wetting and drying cycles in irrigated land influences the conditions of the soil for plant growth, nutrient availability and soil physical conditions that sustain the soil in a suitable state for agricultural production. The research demonstrated how simulation models can be used by scientists to predict the likely effects of irrigation water from different sources on soil salinity and sodicity. It also highlighted the potential to integrate cutting edge information from **geology** and **soil science** for mapping soil problems and to show how management practices, including the application of gypsum, can overcome sodicity in some situations.



Visit the Soil Health
website at
www.soilhealth.com

Intrigue, Subterfuge & Collaboration in the Underground

Professor Sally Smith, The University of Adelaide

The conference honoured Sally Smith who has had a distinguished career in soil science at The University of Adelaide. She spoke about new understanding of arbuscular mycorrhizal fungi for which she has received international acclaim. She is also the co-author of the major scientific book on mycorrhizas which is now in its third edition. After explaining mycorrhizas to the audience, Sally contrasted the 'traditional' view of these plant-root associations with emerging 'hidden' contributions which are only now being demonstrated using modern molecular methods. The new methods make it possible to separate pathways of phosphate uptake by roots from uptake pathways along hyphae of mycorrhizal fungi. This hidden contribution has been shown for wheat but it contradicts the commonly held view that mycorrhizas have little relevance to this crop. She concluded that investigations of how plant and fungal associations work in plant communities in natural environments could hold the key to understanding their contributions in agricultural systems. There are many opportunities for further investigations of these plant-microbe interactions.

Long- Term Genetic Records in Soils: Recording the Effects of Climate Change

Professor Alan Cooper, The University of Adelaide

Alan Cooper has a prestigious position as Federation Fellow at The University of Adelaide. He is investigating the potential for ancient DNA samples in soil and sediments to hold the key to explaining evolutionary processes associated with past global events that triggered climate change. His exciting research seems a long way away from soil science but he showed how understanding the

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the mechanisms of interactions between soil particles and biological substances such as DNA could improve the recovery of delicate biological materials from soil. This ancient DNA might hold a key to understanding our past and predicting our future. Interestingly, some genetic information from ancient DNA belongs to microorganisms as well as plants and animals, so new information about ancient soil microbiology is now available. This was not possible from conventional studies of soil and sediments because they only provided plant histories based on observing pollen.

Of even greater interest is the potential for the ancient DNA to date back almost 50,000 years. This is a very long time for preservation of material of this kind, it is astounding. The research is highly technical and although modern DNA can be a major problem as contamination, these technical difficulties are being overcome. The research is very new and we look forward to exciting announcements in the future. Clearly, soil science has an important role to play in the research to understand how DNA interacts with clays and other soil particles.

Visualising Soils and Landscapes

*Richard MacEwan,
Victorian Department of Primary Industries.*

Richard MacEwan presented an exciting account of modern simulation techniques for illustrating the nature of soil, its inhabitants, its importance to indigenous communities and the simple fact that we probably only see what we want to see. Through the eyes of an artist, there is much more to soil, soil profiles and the environment than is seen by most soil scientists - we were challenged to take a wider view of the materials and environment with which we work.

A dynamic fly-through using Google Earth showed in a very practical way the changing landscape in which we place pipelines, locate agricultural land and build cities. The new perspective offered by rapid advances in emerging technologies enables soil scientists to explore the environment of soil in ways that were not previously possible. An exciting part of Richard's presentation was a digital animation developed by school children on the theme of soil health and soil biology. It combined art and science to investigate the soil environment in an amusing and highly successful manner for the children involved.

Can Australian Soil Science Save the World?

*Adjunct Professor Julian Cribb
University of Technology, Sydney*

This presentation challenged soil scientists to use their resources and knowledge to play a key role in solving world problems, **especially in meeting the food target of future generations within rapidly emerging constraints on availability of land and increasingly limited nutrient resources.**

Julian Cribb highlighted the waste of nutrients washed or blown away in eroded topsoil and the need to retain them for food production rather than supporting microbial and algal blooms in rivers and oceans. We were also challenged to urgently address the need to use nutrient resources more wisely and to re-use them from urban waste streams. World food production needs to double by 2050 but double the land will not be available and nutrient loss cannot continue at the current rate.

Parallel issues related to adequate quantities of clean water and energy use (including the use of arable land for fuel production - displacing agriculturally productive land) pose challenging ongoing issues for soil scientists.

Further information from this presentation will be presented in a future ASC Newsletter.

Australian Society of Soil Science

The 2006 national soils conference showed a vibrant soil science community in Australia which is prepared to tackle global problems through engagement with other organisations and individuals who have a wide range of knowledge and skills. Collaboration is essential and the presentations at the conference demonstrated how widespread systems approaches are already used within the soil science community.

The Australian Society of Soil Science invites members in various categories to participate in its roles of encouraging research and extension in soil science, promoting wise management of the soil resources throughout Australia, increasing government and community awareness of soil science and providing professional development for members through Certified Professional Soil Scientist accreditation.

For further information visit the ASSSI website:

www.asssi.asn.au

Northern Rivers Soil Health Card

This is a monitoring tool for farmers, developed by farmers. In 2002, a group of NSW farmers expressed the need for a soil health monitoring tool. They developed the northern rivers Soil Health Card (SHC) following two facilitated workshops. The SHC was based on a format developed in the USA by the US Department of Agriculture. The process involved a focused TAFE course. The workshops assisted the group in identifying meaningful measures of the health of their soil, rather than measures of soil productivity. A major outcome was that the Soil Health Card could be customised to meet the needs of the users - that means it is flexible and can be altered according to a local situation.

The group considered whether soil characteristics were sensitive to change, easy to use and easy to interpret. They also decided on a range of levels for each indicator according to expectations for their own situation.

There were three important aspects of the process: (i) active participation in the process of developing the Soil Health Card was very important and ensured ownership of the final product and greater potential for it to be used,

(ii) the tool strengthened collaboration in learning and communication among farmers, facilitators and specialists, and

(iii) the participatory learning approach combined scientific knowledge, life-long field expertise of the farmers and a range of approaches to farming practice.

The Soil Health Card has been effectively used with the following outcomes:

- it has raised awareness of soil health and what soil health means within a farming community
- it has fostered discussion about soil
- it has fostered interest in soils generally
- it has encouraged recordkeeping about soil
- it has provided an holistic understanding of soil health in addition to standard chemical analyses
- it has introduced landholders to documentation of potential indicators of soil health and interpretation for management decisions.

Further information about the SHC is available:

www.dpi.nsw.gov.au



Contents of the Soil Health Card

The Soil Health Card for the Northern Rivers area of NSW includes the following information: ground cover, compaction, infiltration, diversity of larger animals, root development, earthworms, soil structure, soil slaking, soil acidity and leaf colour. Additional information can be obtained from Abigail Jenkins at the NSW Department of Primary Industries, Wollongbar.

You may wish to develop a similar Soil Health Card in your farming community. The model used by the northern rivers group could be used elsewhere.

Healthy Soils for Sustainable Vegetable Farms: Ute Guide

Land and Water Australia has recently supported the development of a Ute Guild about soil health for the vegetable industry. Alison Anderson from the NSW Farmers Association has collaborated with others, including AUSVEG Ltd, to produce the Ute Guide. The outcome is a tool to assist vegetable growers to understand their soils and how to manage them in a sustainable manner. The Ute Guide is colourful and informative. It addresses basic information about soil in a manner relevant to vegetable growers and will be available to them free of charge. It is hoped that the guide will encourage vegetable producers to measure, record, interpret and monitor soil health on their properties.

The Ute Guild for healthy soils in the vegetable industry should contribute to better nutrient use efficiency and reduced losses of these valuable resources to waterways and adjacent non-farmland.

- The improvement in understanding of how vegetable production practices affect the soil in both beneficial and detrimental ways should lead to positive changes in practice.
- The information is easily accessible and covers all aspects of the production system associated with soil and the plant environment. Active involvement of the vegetable industry in healthy soil programs will greatly improve the efficiency of resource use in this industry, contributing to its sustainability.

ASC Mission Statement

To provide information about soil that is relevant to all land users.