Unlocking soil's secrets to open the door to agricultural productivity gains

11am - 4pm, Monday 12 November, 2012

Venue: Bayliss Building, MCS Lecture Theatre (Room G33), The University of Western Australia

The need to retain versatile and productive soils for food production and to maximise the output from the land is one of the most important issues of our time. In the context of Global Food Security, as the population increase form 6.8 bill (2010) to 9 bill (2050), the world is facing a 70% increase in food demand during this time.

It has been estimated that land degradation, contamination, urban expansion and conversion of crops and crop lands for non-food production (e.g., energy crops) will reduce the total global cropping area by 8-20% by 2050. Research has indicated that there has been a 1% degradation of productive land for the past two decades. Where will be by 2050? At the current rate we will need to double production with ½ the currently available land. Australia exports two-thirds of its agricultural production; it is an important, albeit not large, contributor to global trade in food, and hence to global food security. It is often suggested that Australia feeds, 60 million people; 22 million domestically and the balance through our exports. To this end, the importance of the agriculture sector to the Australian economy and global food security cannot be overstated.

Given the statements above, this represents both a moral obligation and an economic imperative to maintain and enhance Australian soils to achieve sustainable agricultural production. To this end, what role can science, technology, and innovation play in supporting Australian farmers in maintaining and developing healthy soils?

This symposium will bring together world leading soil scientists to highlight the importance of soil health, from a national and global food security perspective, and the role science can play in unlocking soil's secrets to open the door to agricultural productivity gains.

INVITED SPEAKERS

- **Professor Don Sparks**, S Hallock duPont Chair, Plant and Soil Science, University of Delaware
- **Professor Gary Pierzynski**, Professor of Soil and Environmental Chemistry, Kansas State University
- **Professor Ravi Naidu**, Managing Director: CRC CARE, and Director: CERAR, University of South Australia
- **Professor Nanthi Bolan,** Research Chair of Environmental Science, University of South Australia
- **Winthrop Professor Kadambot Siddique AM FTSE,** Hackett Professor of Agriculture and Director of The UWA Institute of Agriculture, The University of Western Australia
- **Winthrop Professor Lynette Abbott**, Winthrop Professor, School of Earth and Environment & The UWA Institute of Agriculture, The University of Western Australia

PROGRAM OVERVIEW

10.30	REGISTRATION	
11.00	Welcome & introduction	
11.10	Prof. Ravi Naidu	Global Food Security: Issues and challenges
11.40	Prof. Don Sparks	Grand challenges in environmental sustainability: the water, climate, soil, and food nexus
12.30	Prof. Lynette Abbott	Biological aspects of soil health in relation to food security
1.00	LUNCH	
2.00	Prof.Gary Pierzynski	Soil ecosystem services: food security and the future of soil science
2.45	Prof. Kadmbot Siddique	Can Australia maintain its net food exporting status in 2050?
3.15	Prof. Nanthi Bolan	Carbon storage to enhance soil health and agricultural productivity
4.00	CLOSE	

REGISTRATION FEES

- $30 - Current member/staff/student of UWA or CRC CARE
- $45 - Current financial member of Soil Science Australia
- $100 - Non-members of UWA, CRC CARE or Soil Science Australia

*Registration fee covers a light lunch and refreshments

TO REGISTER VISIT: www.soilhealthwa.eventbrite.com.au

Co-hosted by CRC CARE and
The UWA Institute for Agriculture

CRCCARE

THE UNIVERSITY OF WESTERN AUSTRALIA
Achieve International Excellence

SPEAKER AND PRESENTATION ABSTRACTS

Ravi Naidu

Managing Director: CRC CARE & Director: The Centre for Environmental Risk Assessment and Remediation, University of South Australia

ABSTRACT: Global Food Security: Issues and challenges

Food security is emerging as a major global issue. We are likely to see a population of over 9 billion people in 2050. Combined with these population growth estimates, additional factors including changes in food consumption and diet, continuing high levels of food waste and potentially high levels of food diversion to biofuels, predictions indicate we will need to increase our current food supply by somewhere between 50-80 per cent. Working against us to achieve our food production goals are a range of factors including land degradation, climate change and pollution, increased scarcity of nutrients (such as phosphates and nitrogen), declining water availability for agriculture and competing land-uses. So where does Australia fit into the food security story, and how can we assist Australian farmers to achieve sustainable intensification of farming practices? Australia must develop a new research agenda. Australian agriculture requires productivity increases to remain competitive and continue to feed Australian and overseas consumers. This next transformation will need to happen within the real limits of land, nutrients, water and energy resources and the changing society expectation to protect and enhance the environment.

Donald L. Sparks

S. Hallock du Pont Endowed Chair in Soil and Environmental Chemistry
Director, Delaware Environmental Institute, University of Delaware

ABSTRACT: Grand challenges in environmental sustainability: the water, climate, soil, and food nexus

Soil degradation, water quality and quantity, climate change, and food security are the foremost challenges of our time. Soil provides the substrate where all of these challenges commingle and interlace. The importance of basic soil biogeochemical research to address these needs has never been more important. Combining advanced molecular-scale analytical techniques with studies at the macroscopic and landscape scale, and over an array of temporal scales, are necessary to address some of the most important scientific questions related to environmental quality and degradation. This presentation will include case studies dealing with soil, air, and water contamination and carbon cycling/sequestration to show how the application of a multi-scale, interdisciplinary approach can provide important insights into environmental degradation and restoration.

Gary M. Pierzynski

President, Soil Science Society of America
Professor of Soil and Environmental Chemistry
Head, Department of Agronomy, Kansas State University

ABSTRACT: Soil ecosystem services: food security and the future of soil science

Soils provide ecosystem services under four general categories: Provisioning, regulating, supporting, and cultural. Each can be directly or indirectly related to food security and food safety. Contemporary issues within each category will be discussed with an emphasis on research needs and the use of advanced technologies to promote efficient food production. Interactions between our ability to communicate the value of soil ecosystem services, science policy, education efforts, and public perceptions will have a significant influence on the future of the soil science profession. Current interest in food security is a prime opportunity to advance the discipline.

SPEAKER AND PRESENTATION ABSTRACTS

Nanthi S. Bolan

Chair in Environmental Science, Centre for Environmental Risk Assessment and Remediation, University of South Australia

ABSTRACT: Carbon storage to enhance soil health and agricultural productivity

Global warming is a critical environmental issue of the 21st century and the carbon (C) cycle plays a major role both in the cause and mitigation of the global climate change. Recent concerns over increased atmospheric CO_2 have increased interest in the investigation of soil organic C changes and C sequestration capacity in various ecosystems. Promoting soil C sequestration is considered as an effective strategy for reducing greenhouse gas emissions including atmospheric CO_2. Indeed, soil C sequestration is an important option not only to mitigate climate change but also to enhance soil fertility and the productivity of agroecosystems. This presentation will cover various strategies for increasing C sequestration in soils that include minimising cultivation and other soil disturbances through conservation tillage, application of organic wastes such as biosolids and composts, and improved crop rotation involving cover crops.

Kadambot Siddique, AM FTSE

Hackett Professor of Agriculture

Director of The UWA Institute of Agriculture, The University of Western Australia

ABSTRACT: Can Australia maintain its net food exporting status in 2050?

The presentation will cover Australian agriculture and food production capacity, export and the value of food industry as a whole. The presentation also will deal with our increasing trend for importation of food into Australia, population growth, future predictions and the impact of climate change on food production and export. In order to maintain Australia's food production capacity in 2050, we must innovate, adopt and reform. To do this we need to do the following: bring existing knowledge into use; build the capacity of institutions to undertake strategic research development and extension; get the policy and institution settings right; increase R,D & E investment; conduct research that meets the needs of agriculture and ensure research has impact; conduct microeconomic reform and make structural adjustments.

Lynette K. Abbott

Winthrop Professor, School of Earth and Environment & The UWA Institute of Agriculture, The University of Western Australia

ABSTRACT: Biological aspects of soil health in relation to food security

Soil security is essential for food security. Soil biodiversity has the potential to support effective soil function through bio-physical and bio-chemical interactions. Interactions between soil particles and soil organisms, and interactions among soil organisms facilitate key processes such as nutrient cycling, nutrient acquisition by plants, disease suppression, soil aggregation and soil water retention. Soil carbon can be either lost or protected depending on soil biological activity and strategies for application of fertilisers need to complement biological processes rather than suppress them. The ongoing sustainability of agricultural systems necessary for food security will include capturing the benefits from soil biological fertility.