NSW GOVERNMENT Primary Industries

PRIMARY INDUSTRIES
SCIENCE & RESEARCH

BRIEFING NOTE

Soils
–Winter 2011

INTRODUCTION

Soil underpins global agriculture and forest production. Australian soils are generally shallow, low in natural fertility and prone to degradation through erosion, salinisation, acidification, structural decline and depletion of soil carbon and biology. The expanding use of different types of waste materials in agriculture and forestry improve sustainability, but can pose contamination risks if not properly managed. Only 10% of Australia and 15% of NSW is prime crop and pasture land with a combination of soils and climate suitable for highly productive agriculture.

Soil research priorities are driven by the need to increase productivity, food security, protect the fragile resource base, adapt to a changing climate and sequester soil carbon. Soils research also underpins the development of sound land, water and climate policies.

KEY RESEARCH PROGRAMS include soil nutrient management; managing soil degradation (salinity, acidity, erosion and structural decline); soil carbon sequestration; recycled organics and managing contaminants; legume innoculants; development of new methods for soil sampling and testing; and organic agriculture.

RESEARCH CAPABILITIES

- There are 26 soil research staff with a further 6 soil extension specialists.
- Soil research staff are embedded in farming and forestry research teams located at our 14 research Centres of Excellence across NSW.
- Staff have access to the latest field sampling and laboratory analysis equipment for soil chemical, physical and biological analyses.

CONTACT US

For more information on our full portfolio please contact Peter Slavich (02) 6626 1352 or *peter.slavich@industry.nsw.gov.au*

PROJECT UPDATES

CANOLA IN DEPTH (2006–2010)

INTRODUCTION: Canola yields declined in southern Australia during the 1990s due, in part, to subsurface soil constraints including hardpans, salinity, acidity and sodicity. This project quantified the impact of those sub surface soil constraints.

FINDINGS: The trial period (2006-2009) was dominated by drought, when soil moisture was at a premium. While deep ripping to 30cm is usually effective in reducing soil compaction and enhancing root growth, it also allowed soil moisture to drain below plant roots, reducing yeilds. In drought years, the yield loss due to deep drainage exceeded the benefits of removing soil compation. Results also demonstrated no response to the addition of lime or gypsum during this drought period. These results are the reverse of results in normal to wet years when deep ripping and lining enhance yields. This highlights the impact of seasonal conditions on soil amendments.

CONTACT: Dr Mark Conyers, Wagga Wagga (02) 6938 1830

PARTNERS: GRDC, Charles Sturt University, CSIRO Plant Industry, Victorian DPI, Farmlink

COASTAL NSW DAIRY CATCHMENTS (2009-2012)

INTRODUCTION: Dairy farms utilise large quantities of nutrients, some of which may be lost in surface runoff and subsequently contribute to degraded water quality, as well as representing an economics loss. Research is being undertaken to identify key sources of loss from within dairy farms and evaluate mitigation strategies.

FINDINGS: Preliminary findings suggest that the greatest incidence of nutrient loss due to runnoff occurs in intensive grazing areas where the milking herd spends time. The effectiveness of various management strategies designed to reduce losses from these grazing areas is being evaluated. The results of this project are being incorporated into a number of farmer extension programs.

CONTACT: Dr Warwick Dougherty, Richmond (02) 4588 2112

PARTNERS: Dairy Australia, Dairy NSW

QUALITY AND USE OF LEGUME INOCULANTS (2005-2013)

INTRODUCTION: Rhizobia in legume root nodules convert atmospheric nitrogen into ammonia, providing a low cost alternative to nitrogen fertiliser. Our Australian Innoculents Research Group (AIRG) maintain and distribute and test rhizobia innoculants used by all Australian innoculant manufacturers to ensure their quality.

FINDINGS: AIRG has recently established a Quality Assurance 'tick' which will be attached to all commercially available innoculants that meet quality standards. Replacement of nitrogen fertiliser with biologically fixed nitrogen saves farmers an estimated $36b per year in fertiliser costs.

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PARTNERS: Grains Research and Development Corporation (GRDC), University of Sydney, Innoculant manufacturers.

ASSESSING SOIL EROSION IN MACADAMIA ORCHARDS (2005–2009)

INTRODUCTION: Soil erosion is an issue in macadamia orchards as the densely canopied trees shade out groundcover. This leads to soil loss, root exposure and pollution of waterways.

FINDINGS: Stemflow in macadamias was higher than most other trees. Up to 1,000L of water was recorded per tree trunk in 24 hours during storm events. Harvest machinery also contributed to soil loss under the trees. Recommendations are for soil protection specifically under the trees (for example, smother grass, mulch or compost). These recommendations will also protect water courses from sedimentation and nutrient pollution.

CONTACT: Justine Cox, Alstonville (02) 66262434

PARTNERS: Horticulture Australia (HAL), Aust Macadamia Soc

QUANTIFYING THE BENEFITS OF BLENDED GARDEN ORGANICS COMPOST IN VEGETABLE PRODUCTION, (2005– 2012)

INTRODUCTION: Around 0.5Mt of garden organics compost is produced in Greater Sydney each year. This contains 20-25% carbon and nutrients such as nitrogen (1-1.5%) and phosphorus (0.2-0.4%), and has potential for use in intensive agriculture in the Sydney Basin. This may represent an alternative input for vegetable production to traditional fertilisers and poultry manure, which are sometimes applied at excessive rates.

FINDINGS: An evaluation of crop yield, nutrient cycling, soil health, and economic inputs/outputs indicate that garden organics compost represents an economic alternative to current farmer practice, with additional associated soil quality benefits and reduction of nutrients in farm runoff.

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Australian Centre for International Agricultural Research, Canberra; HAL, Department of Environment, Climate Change and Water

TESTING FOR THE SAFE RE-USE OF METAL CONTAINING WASTES ON LAND (2003–2012)

INTRODUCTION: There is increasing use of organic and inorganic residuals in agriculture and forestry. While improving soil structure, carbon and nutrient status some residuals contain heavy metals and pesticides. This research is improving our understanding of how contaminants behave in soil and developing guidelines to ensure contaminants do not enter the food chain.

FINDINGS:The effects of metal contaminants from biosolids and metal salts on plant growth (wheat and pasture) and on soil microbial function were examined as part of the National Biosolids Research Program (NBRP). Data collected helped develop systems to prevent food-chain contamination based on soil properties. Our research has shown caution is needed when using recycled organics on agricultural lands. The work has also underpinned EPA guidelines on reuse of recycled organics in agriculture and forestry.

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PARTNERS:NSW Environmental Trust (DECCW), Sydney Water, CSIRO, National Biosolids research Program (NBRP)