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NSW component of the National Biosolids Research Program

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About CROA

The Centre for Recycled Organics in Agriculture (CROA) was launched in November 2002 with supporting funds from the Department of the Environment and Heritage, the Natural Heritage Trust, NSW Department of Primary Industries and the Department of Environment and Conservation (NSW).

The Centre offers a research, development and extension resource for Government and the resource recovery industry for developing options for beneficially reusing products made from recycled organics (RO) and other recovered materials in agriculture.

CROA aims to provide technical support to waste and fertiliser regulations, with outcomes of:

- greater community confidence in the use of these products;
- better informed regulatory decisions based on independent scientific data; and
- protection of agricultural markets and agricultural product safety

These objectives are being met by undertaking collaborative projects, which assess and develop new products, examine critical soil and environmental criteria, produce best practice guidelines and develop extension programs for beneficially reusing recovered resources.

Researching and promoting the resource value of Recycled Organics (RO)



CURRENT PROJECTS

Over the past three years 6 projects have been established to identify the benefits of reusing recycled organics in agricultural and environmental applications. These projects are improving our understanding of how these materials behave in the environment and will contribute to creating new markets for recovered resources, whilst ensuring they are reused appropriately.

The NSW component of the National Biosolids Research Program (NBRP) - Mark Whatmuff (2 projects funded by the NSW Environmental Trust and Sydney Water Corporation)



These experimental plots containing metal salts at CROA form part of the NBRP.

The National Biosolids Research Program (NBRP) has been operating since 2002 on a range of sites in NSW, SA, QLD, WA and Vic. Similar designs and methods are used throughout to enable comparison and consolidation of results for a range of soil types and conditions from across Australia. The program assesses the effects of the heavy metals cadmium, copper and zinc, on plant growth and product quality using wheat, as well as the health of soil microbe and invertebrate populations. With this information, the NBRP aims to provide a basis for refining existing Biosolids Guidelines across a wide range of soil type and application scenarios. The same information can also form the benchmark for regulating other metal-containing waste materials.

To date, yields generally increased with increasing rates of biosolids addition, although this increase differed between the two sites at CROA. The lime amended biosolids had less positive effect on plant yield than the dewatered material. However, soil pH increased with biosolids application, particularly for the lime amended biosolids.

Both plant growth and soil microbes have proven to be sensitive indicators of excessive soil Cu and Zn. On soils from one of the CROA sites, tests designed to indicate the soil microbial population's ability to mineralise added nitrogen showed potential toxicity effects from added Cu and Zn. These effects were seen at soil metal concentrations below current NSW biosolids guideline soil metal limits. However, it should be noted that the metals in these treatments were added as inorganic salts which we would expect to be in a more toxic form than those found in biosolids. Following from this, there was no metal toxicity from the biosolids, even at application rates of up to four times higher than the recommended annual addition.

At one of the CROA sites, biosolids applied at higher than recommended rates reduced the soil microbial population's ability to mineralise added nitrogen. However, this was thought to be a result of excess nutrient additions rather than metal toxicity. It is likely the soil microbial population in this soil was particularly sensitive because of the previous management practices such as over-cultivation. This highlights the need to consider potential effects of biosolids and other wastes on soil microbial populations, given their importance in cycling nutrients.

The NSW component of the program has now completed its final cropping phase and is due to finish in October 2005. A further three years funding has been secured from the NSW

Environmental Trust to continue the examination of the effects of metals on soil microbial populations at CROA.

Recycled organics and catchment management (Percy Wong and Phil Pengelly) (Funded by Department of Environment and Conservation (NSW)).

This three-year collaborative project between NSW Department of Primary Industries, Department of Environment and Conservation NSW and Sydney Catchment Authority has studied the effects of composted recycled organics (RO) for controlling runoff and soil erosion on degraded land.

Some of the results from a replicated trial at Bungonia, near Goulburn, were presented at a field day on 24th June, 2005. The field day was attended by 54 participants representing major stakeholders, including catchment managers, compost processors, landholders and DPI officers.

The benefits of the use of composted RO for soil rehabilitation have been shown by our research, with positive flow-on environmental effects on soil erosion and water quality. These products have commonly been used to stabilise roadside areas and there appears to be a role for these products in rehabilitating degraded areas in water catchments. In view of cost of the materials, the benefits in catchment areas can be maximised by the strategic placement of appropriate rates and types of RO products to stabilise targeted, high-risk areas.

The project has recently been extended for another 12 months to conduct a second rainfall simulation at the Bungonia trial site, develop guidelines for the efficient use of RO products in catchment management and stabilise the watercourse by planting tube stocks of native shrub and tree species.



Rainfall simulation in the rain at the Bungonia field day! (June 2005).

Effect of granulated biosolids application to turf on nutrient runoff and growth characteristics (Simon Eldridge) (Funded by Sydney Water Corporation).

This project forms part of Sydney Water's strategy to diversify its market for biosolids. It has been examining the fertiliser value and impacts on nutrient runoff characteristics of granulated biosolids surface-applied to turf. Two rainfall simulations have been conducted on the experimental plots at CROA to measure treatment effects on runoff, as well as nutrient and pathogen transport. A final rainfall simulation is scheduled for October 2005. Detailed studies have also been performed adjacent to the plots to measure nitrogen mineralization rates from the granulated biosolids to improve understanding of how these products can be used to supply nitrogen to turf.



Simon Eldridge (far left) conducting a rainfall simulation at CROA for delegates from an International workshop on biosolids (March 2005).

Quantifying the benefits of recycled organics for agricultural cropping systems (Yin Chan) (Funded by DEC).

This four year project, which was officially launched by NSW Primary Industries Minister, Ian McDonald in April 2005, aims to quantify the agronomic, soil and environmental benefits of using composted garden organics (CGO) in agricultural cropping systems in NSW. The first phase of the project involved identifying which markets have the greatest potential to consume CGO products. This study identified that vegetable growing areas within the Sydney Basin could benefit from soil conditioners made from CGO, whilst wine growing areas in the Hunter Valley and Central West NSW could be good markets for CGO mulches.

The next phase of the project has involved establishing an experiment at CROA, as well as field trials in vineyards in Central West NSW, to quantify the respective benefits of CGO soil conditioner and mulch on crop productivity and soil physical, chemical and biological characteristics.

The first broccoli crop at CROA was harvested in August 2005, whilst mulch is currently being applied to vines in time for the 2005/06 grape growing season. These sites will be monitored for a range of agronomic and soil parameters over the next three years.

Other components of the project have included analyzing compost samples from processors, collecting soil samples from vegetable farms within the Sydney Basin and vineyards in the Hunter Valley and Central West, as well as performing pot trials to evaluate compost performance.



Camden MP Geoff Corrigan (from left), Dr Yin Chan and Primary Industries Minister Ian McDonald planting broccoli seedlings at CROA (April 2005).

Using compost for improving soil and land condition in the Hawkesbury-Nepean Catchment (Chris Dorahy) (Funded by DEC)

The objective of this new project is to assess the risk and evaluate the ability of compost prepared aquatic weed harvested from the Hawkesbury-Nepean River to restore degraded areas of the catchment. This will be achieved by validating the composting process to ensure that no weeds remain viable after composting. Rainfall simulations will also be performed at CROA to measure treatment effect on runoff and soil erosion.

The risk assessment component of the project is due to commence in September 2005, with the rainfall simulations to start once the final compost has been produced.

The outcomes of this project will be used to divert organic material from landfill, promote the reuse of recycled organics in catchment rehabilitation works and contribute to overcoming one of the factors which have led to aquatic weed outbreaks in the Hawkesbury-Nepean River.



Stockpiles of aquatic weed harvested from the Hawkesbury-Nepean will be composted as part of a new joint project between the DPI and DEC.

International visitors

Over the past twelve months CROA has hosted a number of visitors from various parts of the globe, including the:

- Shanghai-Pudong EPA, Sanitation Management Bureau and Solid Garbage Management Office (November 2004);
- Australian and New Zealand Soil Science Conference "SuperSoil 2004" (December 2004);
- Israeli, Jordanian and Palestinian Ministries of Agriculture, Environment and Health, who participated in an International Workshop on Biosolids organised by the USDA and USEPA (March 2005); and
- Postgraduate students from Germany, Denmark and the Netherlands who were studying at the University of Western Sydney as part of the LEAFSE program.

This has been a great opportunity to showcase the research the NSW DPI is doing in relation to recycled organics, learn about related work being conducted overseas and foster linkages for collaborative projects in the future.

Turning noxious weeds into compost

Earlier in the year, the CROA team spent two days removing African Boxthorn (*Lycium ferocissimum*) from

the Night Paddock. In a case of practising what we preach, it has subsequently been taken to a local composting facility, where it has been turned into mulch and/ or soil conditioner for beneficial reuse.



Simon Eldridge (from left), Martin Gilmour, Darren Fahey, Phil Pengelly, Lyn Muirhead and Deirdre Harvey in front of a pile of African boxthorn (*Lycium ferocissimum*) removed from one of the paddocks at CROA.

OH&S Award for CROA

CROA was recently recognised by the Board of Management at the Elizabeth Macarthur Agricultural Institute for its effort in addressing Occupational Health and Safety requirements at the site. In particular, Lyn Muirhead was singled out for her efforts in driving the process.

These initiatives have included:

- Appointing Lyn Muirhead as CROA's representative on the EMAI OH&S Committee;
- Holding a workshop in April 2005 to review OH&S policies and procedures at CROA;
- Establishing a site register and procedures for evacuating the site in case of emergency;
- Updating old and creating new Safe Work Method Statements and Risk Assessments for day to day activities.
- Issuing appropriate Personal Protective Equipment (PPE) to staff.

The process is on-going and highlights the effort made by the staff in ensuring

CROA is a safe place to work and visit.



Lyn Muirhead receiving an OH&S Award for CROA from EMAI Director Dr Paul Arthur (centre) and Board of Management member Dr Garry Levot.

For more information on CROA contact: Dr Chris Dorahy (Technical Specialist – Recycled Organics) (02) 4640 6443 or (0437) 407 443, chris.dorahy@dpi.nsw.gov.au



NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Staff Updates

Dr Percy Wong retired in August 2005 after working for the NSW DPI for more than thirty years. Thanks Percy for all of your effort over the years and best of luck in your retirement and future mycological pursuits. Martin Gilmour left the DPI in May 2005 to take up a role as a Scientific Officer with the Sydney Catchment Authority.

Adam Pirie has recently been appointed as a Technical Officer and is responsible for managing and coordinating the day to day activities at CROA. Ian McMaster has recently joined the team and will be working as a Technical Officer on the new DEC project relating using compost to improve land condition in the Hawkesbury-Nepean catchment. Welcome to both Adam and Ian.