COMPOST AUSTRALIA

The peak national association for the organics processing and recycling industry

3rd Compost R&D Forum

Australasian R&D Forum

Murdoch University, South St, Murdoch, WA

5-7 September 2007

FINAL REPORT

Department of Agriculture and Food
Government of Western Australia

Department of Environment and Conservation

AGRICULTURAL RESEARCH WESTERN AUSTRALIA

MURDOCH UNIVERSITY
PERTH, WESTERN AUSTRALIA

Acknowledgements

The Third National Compost R&D Forum was made possible by funding from the Waste Management Association of Australia through Compost Australia, the Department of Environment and Climate in Western Australia and Agriculture Research WA (ARWA).

The forum was also generously supported by Murdoch University and the WA Department of Agriculture and Food (DAFWA).

Special thanks go Dr Wally Cox for opening the Forum and to Professor Lyn Abbott for addressing the evening function.

Thanks also to Dr Jaya Nair who organised and coordinated the venues and catering at Murdoch Universdity.

The final program was developed in conjunction with an advisory group made up of:

Angus Johnston, Compost Project Manager, Compost WA
Bob Paulin and Peter O'Malley, DAFWA
Jaya Nair Dr., Murdoch University
Johannes Bialas, The iorganic Force
Kevin Wilkinson Dr., DPI Victoria

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2007 National Compost R&D Forum

The Annual National Compost R&D Forum is supported by Compost Australia, the Recycled Organics management sub group of the Waste Management Association of Australia (WMAA).

The objective

The forum will build on the inaugural event held at the University of NSW in 2005 and subsequently at SARDI in Adelaide in 2006. With the goal of increasing the demand for quality recycled organic products, it will continue to provide opportunity for stakeholders involved in Compost Research and Development to showcase work done nationally and to:

- Develop national R & D objectives for increasing the production and marketing of Recycled Organic products;
- Minimise duplication of effort and maximise progress by developing collaborative projects that make the best use of resources that are located at different centres round Australia;
- Expand and develop Recycled Organics Sector networks within Australia and New Zealand as well as to explore International opportunities;
- Identify and lobby funding bodies for additional research funds, and
- Continue to refine a national research and development framework for the Recycled Organic Sector.

The afternoon of Wednesday 5th September provides an opportunity to visit the DICOM site in Subiaco to see progress with one of the newest composting technologies ahead of a two day program. The program will challenge how we see the role of recycled organics in the future, update the priority research and development themes identified at the 2006 forum in light of current work and the marketing priorities developed at Compost Australia's recent Canberra forum, and develop implementation strategies.

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PROGRAM OUTLINE

Wednesday 5 September

3.00pm - Visit to the DICOM Waste Management Facility

A unique approach to managing mixed organic wastes using initial sorting prior to a three stage process that utilises a period of anaerobic digestion in the middle of the two in vessel composting stages. Compared to most composting systems, the DICON process recovers energy, significantly reduces processing time and increases product maturity.

Evening free

Thursday 6 September

Invited speakers program

Include a report on the Canberra Marketing forum and submitted papers that address the main identified issues from the 2006 Adelaide R&D Forum, namely

- *Market*
- *End users*
- *Applications*
- *Standards*
- *Production*

Dinner: Thai Corner Restaurant, Canning Highway, Mt. Pleasant

Guest speaker, Prof Lyn Abbott, University of WA

Friday 7 September

Facilitated Workshop

- *Finalise R&D issues, develop components and Prioritise*
- *Develop implementation plans for key components of the main issues – what, who and when.*

Day 1 – Program, National R&D programme

Chair	Page	Time	Topic	Presenter	Session
Angus Campbell		0830	Opening address	Dr Wally Cox	
	3	0850	SA - Compost R&D objectives	Katie Webster TBC	*Review*
	4	0900	WA - Compost R&D review	Bob Paulin	*Review*
	5	0910	Victoria - Compost R&D review	Kevin Wilkinson	*Review*
	6	0920	NSW - Compost R&D review	Angus Campbell	*Review*
	10	0930	Queensland - Compost R&D review	Johannes Biala	*Review*
	11	0940	Report on Compost NZ R&D Forum Oct '06	Mike Lord	*Review*
	12	0955	Outcomes from CA Marketing Forum, Canberra and panel review (15 min)	Angus Johnston	*Review*
	13	1015	Panel review	All	*Review*
		1030	**Morning Tea**		
Angus Johnston	15	1100	Guidelines for using compost in land rehabilitation and catchment management – an overview	C Dorahy DPI NSW	*Markets*
	16	1120	Creating markets for compost in sports turf management	M. Jackson DECC NSW	*Markets*
	17	1140	Role of composting in biosecurity and the plant and animal industries	Kevin Wilkinson DPI Vic C Dorahy, J Biala	*Markets*
	18	1200	Compost for rehabilitation purposes	Jaya Nair Murdoch University, ETC Group	*Markets*
		1220	**LUNCH**		
Kevin Wilkinson	20	1320	The effects of recycled organics on soil biological health and their role in building more resilient farming systems.	C Dorahy DPI NSW	*Applications*
	21	1340	Suppression of soil-borne plant disease using compost.	Matt Ayres SARDI Plant & Soil Health.	*Applications*
	22	1400	Synthesis of a citrus thrips IPM system with production and environmental benefits -.	Peter Crisp & Greg Baker, SARDI Entomology	*Applications*
	23	1420	Compost as part of a vineyard salinity remediation strategy	Katie Webster, Compost for Soils	*Applications*
		1440	**Afternoon Tea**		
Bob Paulin	25	1510	Agriculture - Challenging the production system	Stephen Harper, Qld DPI	*End user*
	26	1530	Benefits of using compost on the sandy soils of the swan coastal plain	P O'Malley, DAFWA	*End user*
	27	1550	Compost use in NSW vegetable production	Alison Anderson, NSW Vegetable IDO	*End user*
	29	1610	Some developments in organic waste recycling R&D	H Hofstede - Spartel	*Production*
	30	1630	Vermiculture Revolution: Rapid Composting of Waste Organics	Rajiv K. Sinha & Gokul Bharambe	*Production*
	31	1650	**Final review of the key issues for Day 2 workshops**		*Review*
		1710	**CLOSE**		
		1930	**Prof Lyn Abbott, University of WA 'The soil carbon see saw'.**	**Forum dinner, Thai Corner Restaurant Canning Highway, Mnt. Pleasant**	

Review session

SA Compost R&D objectives

Presented by Katie Webster,
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Three of South Australia's largest compost processors have joined together to initiate the 'Compost for Soils' project, with support from the National Landcare Programme and Zero Waste South Australia. The project is addressing the compost industry's objectives of providing current and consistent information for horticultural producers, and developing novel compost formulations for higher value applications in agriculture. The features of the Compost for Soils project are:

1.1 Research and Development

Based at the South Australian Research and Development Institute (SARDI), research scientist Matthew Ayres is investigating the use of compost and novel compost formulations for disease suppression and management in vegetable crops on the Northern Adelaide Plains. Pests and disease currently account for a significant proportion of crop loss and failure. Through the appropriate use of compost and specially developed compost formulations, it is envisioned that improved management of pests, disease and crop health can be achieved, with the potential for reduced reliance on chemical pesticides.

Further work at SARDI is being overseen by scientist Mike McCarthy. This project is looking at the use of specially formulated composts for 'injection' to depth in the soil during deep-tillage operations for vineyard renovation. The use of this approach offers improved longevity of soil works and improved soil and root structure.

Industry Development

Two industry development officers have been appointed to the project to develop information and tools for horticultural producers on the use of compost for more efficient crop production. Tony Burfield of SARDI and Katie Webster of the Compost for Soils project are developing a range of information, tools and field demonstration trials:

- Development of the Compost for Soils website (www.compostforsoils.com.au)

- Information sheets for vegetable, viticulture and orchard producers
- Tools and calculators for agronomists, consultants and growers
- Technical advice for growers, agronomists and consultants
- Literature reviews to ensure access to the latest information
- Field demonstrations in viticulture – managing vineyard variability with compost
- Field demonstrations in vegetable production – benefits of increased soil organic carbon
- Field demonstrations in orchards – managing water, weeds and soil with compost
- Establishing links with other projects and researchers in South Australia and more widely

WA Compost R & D objectives

Bob Paulin, Department of Agriculture and Food, Perth WA
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Objectives

Develop and promote the use of compost, principally in agricultural situations that:

- Develop agricultural and other compost uses that increase productivity, benefit the environmental and manage social issues important soil focus;
- Develop quantifiable compost quality standards;
- Develop agriculture and particularly horticulture as a long term markets for compost – with soil focus DAFWA;
- Provide input and support to policy and regulation that will facilitate market growth; and
- Foster R&D collaboration between stakeholders.

Current work

Compost WA:

- Developing the basis for a national communication plan; and
- Gained funds to develop a marketing plan – coordinated with Compost Australia

DAFWA - Work has continued at the original Vegetable site at the Medina Research station to develop a better understanding of the interrelationship between compost, soil organic carbon levels, soil fertility (principally nitrogen) and crop performance.

Compost production, DICOM hybrid composting / anaerobic digestion process promising more rapid compost production and Spartel modular static pile system and several processes being developed to process poultry manure and produce products that do not breed flies.

Custom Composts are continuing investigations into the use of peletised compost, principally for cereal and other extensive agricultural situations.

Planned work

Work with vegetable industry to develop improved production practices that focus on using compost and changing aspects of management to increase soil organic carbon levels and achieve improved productivity. Funding has recently been improved to initiate grower workshops as a first step in developing production that will also deliver better environmental and social outcomes by reducing reliance on fertilisers and pesticides and making better use of irrigation.

EMRC – extending earlier work with viticulture

DICOM and the two poultry manure processing approaches are currently undergoing commercialisation.

Confirm preliminary compost quality specifications developed for vegetables that is based the Californian / US Compost Maturity index for assessing compost quality.

Theme: Review

Victoria Compost R&D objectives

Kevin Wilkinson

NSW Compost R&D objectives

Angus Campbell, Recycled Organics Unit www.recycledorganics.com

The NSW research and development priorities focus on three issues that target growth in sales and revenue for the NSW industry:

- What product performance information do we need to enable growers (customers) to integrate recycled organics into farm management systems (including nutrient and irrigation budgets) so as to optimise grower value from the use of the product
- What product performance information do we need to enable the recycled organics industry to promote and sell product on the basis of it's true value from an agronomic point of view;
- What product performance information do we need to quantify the environmental services value of recycled organics products, and how can this value be realised.

The R&D priorities identified by the industry in NSW are:

1. Quantify N & P mineralisation / nutrient contribution over time from the application of RO products, and the soil conditioner value (ie. gypsum and lime value).

2. Soil conditioner and fertiliser value of RO products blended with chemical fertilisers/poultry manure. Quantify the ability of high nutrient level compost blends in agriculture to reduce inorganic fertiliser use.

3. Expand and improve the nutrient contribution calculator to incorporate data from above.

4. Quantify irrigation water savings from varying products and application rates in irrigated agriculture.

5. Categorising compost products for different applications:
    - Product development;
    - Performance longevity;
    - Compost maturity;
    - Disease suppression.

6. Carbon Credits: Standard rates for calculations in agriculture and rehab markets (including carbon abatement from reduced nutrient application, reduced nutrient loss and other relevant environmental impact categories).

7. Carbon sequestration/soil carbon value to soils with programmed RO application - eg, if RO is spread every 5 years, what is sustained soil C increase results?

Other areas of interest

- Fuel RDF/SRF applications- eg cement kilns and power stations, small scale CHP- research on opportunities and pilot scale projects
- Agrichar.

DECC Organics Program 2007/08

The following program is proposed by NSW Dept of Environment and Climate Change for the 2007/08 financial year. Note, this is DECC draft and may be subject to change prior to formalisation.

1. TRIAL SITES –Mine-sites, Turf, Parks and Gardens, Salinity.

Commence scientific trials conducted by the University of Sydney into compost benefits in turf establishment and top dressing.

Finalise maintenance of salinity sites, hand over to farmers. Finalise monitoring of roadside salinity sites and report on findings.

Demonstrate whether pre-mixing compost with mine site overburden can prove to be a financially viable way of using composts in mine site rehabilitation. Establish one demonstration trial in the Hunter region.

Finalise partnership demonstration projects in Parks and Gardens with Penrith, Ku-ring-gai, Port-Macquarie-Hastings Councils and the DET. Conduct workshops for parks managers in Councils in compost benefits and application.

Deliverables: establishment of scientific turf trials, one mine site demonstration trial, one presentation to the Hunter coal and environment group, roadside salinity trials report, parks and gardens demonstration sites at 3 Councils and 3 DET sites, field days, workshops for Council parks managers, case studies published.

2. RECYCLED ORGANICS UNIT

Manage the Departments three year $30,000 p.a. agreement with the ROU for the period 2006-2009.

Deliverables: the maintenance of the ROU website www.recycledorganics.com and the online library catalogue www.rolibrary.com and preparation of the e-newsletter twice per annum.

3. ROADMAP SUPPORT AND PROMOTIONS

Provide financial and management support for the *Compost Supply Chain Road Map*, a project of Compost Australia. Contribute to the shared funding of the Compost Australia project manager.

Workshop and develop a NSW Research and Development Plan to inform national research and DECC's annual Organics Program. Sponsor International Compost Awareness Week; assist in the planning, managing and promoting of council, commercial and community compost projects

Deliverables: continuation of the project manager's position, support for, and leverage from, national projects, agreed industry R&D plan, events to promote compost in conjunction with International Compost Awareness Week run in conjunction with Compost Australia.

4. *C&I FOOD WASTE REVIEW*

Work on the Municipal sector has been completed. For 07-08 the focus will be on food waste from the C&I this sector. This work will:

Continued

- Identify major point sources of C&I food organics where reuse/recycling is not widely practiced,
- Develop guides and education plans for the businesses identified above on appropriate reuse/recycling opportunities,
- Review with collection contractors the options for optimising food recovery,
- Develop a planned intervention to increase food segregation, collection and recycling.

Deliverables: Point sources and recycling gaps identified, guides and education plans, review of contractor services and opportunities, plan of intervention.

5. *GOVERNMENT PANEL CONTRACT FOR COMPOST*

Document and consult on the benefits and potential drawbacks of establishing a NSW Government Period Contract for composted products through the NSW Department of Commerce. Commence procedures for listing compost as a period contract if outcome of consultations are favourable.

Deliverable: issue paper on period contract for compost; procedures commenced for establishing a period contract.

6. COST BENEFIT IN AGRICULTURE

Assist in managing the final vegetable and viticulture crop reporting (field trials program being conducted for DECC by NSW DPI). Assist in the completion of the cost benefit analysis for both cropping systems.

Deliverables: long term cost benefit analysis of recycled organics in agriculture

7. CATCHMENT REHABILITATION AND BIOBANKING

Complete the demonstration sites established under two year partnership agreements with Southern Rivers CMA and Hunter-Central Rivers CMA

Pursue options for the inclusion of recycled organics within the parameters of the Departments Biobanking Scheme through ongoing discussion with the Bio-conservation section on guidelines and options for using compost in future work programs.

Deliverables: complete establishment of CMA trial sites, technical training and support, inclusion of recycled organics within bio-conservation work programs.

8. RECYCLED ORGANICS IN STORMWATER FILTRATION AND ROOF GARDENS

Document Australian examples of roof gardens; conduct a workshop for professionals in the landscaping business.

Deliverables: reference list of Australian examples of roof gardens, workshop in demonstration garden targeting landscape architects

9. URBAN SUSTAINABILITY/CLIMATE CHANGE GRANTS OPORTUNITIES

Promote the use of recycled organics in the roll-out of the approved USP and Climate Change grants.

Deliverables: increased use of recycled organics in grant projects

10 BIOFUELS/CHAR

Provide quarterly brief updates to the Organics Section and SPD Division on developing trends in production technology and international and local policy in biofuel and biochar production. Advise on Waste Strategy implications of biofuel industry developments. Provide input to policy discussions where appropriate.

Deliverable: quarterly updates, policy advice as appropriate, attend industry specific meetings and seminars.

11 LANDFILL BIOCOVER PILOT

Engineered biocovers using recycled materials such as compost, shredded wood/timber and crushed concrete are a low cost and highly effective treatment option for removing greenhouse gases from emissions arising from small to medium sized landfills. Biocovers are one of the few cost effective ways of reducing the greenhouse impact of small to medium sized landfills where active gas extraction (and flaring / energy recovery) is uneconomic. In 2004/05, 373 of the 400 active landfills in NSW were classified as small to medium in size (receive < 60,000t/yr) and in total receive approximately 25% of all waste landfilled in NSW Of these, almost 300 are non-licensed. To encourage operators of such landfills to start to address their greenhouse impacts, SPD has been working with EPRD to introduce measures (specifically biocovers constructed from recycled materials) into the revised version of the Department's *Environmental Guidelines: Solid Waste Landfills*. Biocovers or equivalent measures may become mandatory for smaller licensed landfills, but will be a voluntary measure for non-licensed landfills, many of which are Council owned and operated. The project will continue the cooperative approach with EPRD in promoting landfill biocovers.

Deliverables: In cooperation with EPRD promote the use of landfill biocovers to local government.

11 PARKS AND GARDENS HUNTER

Building on the work with Penrith City Council, manage projects with two Hunter Councils in drought effected sporting fields; compare composted topdressing to conventional sand/soil mixes used for renovating sporting fields and/or areas to be returfed.

Deliverable: demonstration of composted product benefits in Parks and Gardens, improved processes for local government purchase of composted products for parks and gardens.

12 PARKS AND GARDENS ILLAWARRA

Building on the partnership with Wollongong City Council, establish a partnership with another Council on the South Coast to trial compost in their parks and gardens operation to encourage sustainable purchasing outcomes through local government purchase of locally derived composts.

Deliverables: demonstration of composted product benefits in Parks and Gardens, improved processes for local government purchase of composted products for parks and gardens.

NSW DPI current field research

The NSW DPI Centre for Recycled Organics in Agriculture (CROA) August 2007 newsletter is also attached, this provides an overview of field research trials currently being conducted by the DPI in NSW.

ROU current research

- The ROU continues to expand and maintain the **www.rolibrary.com** online catalogue of resources. All **researchers and govt agencies** are again encouraged to submit resources for cataloguing on this system to ensure national accessibility.
- National industry survey 2007 – it is happening right now, organics processors in **SA** and **WA** have already received the 2007 survey; NSW, Qld and ACT will follow shortly. **If you have changed your contact details** – please find me and let me know now.
- The **Composted Mulch Nutrient Contribution Calculator** for Vineyards and Orchards developed by the Recycled Organics Unit estimates the contribution of N, P and K and allows growers to begin to integrate composts into nutrient budgets. ROU is updating this on the basis of results from field trials as data becomes available. Current version available on-line at http://www.recycledorganics.com/product/agriculture/agriculture.htm
- Newly released reports on pest and disease suppression; on compost teas; and performance based mulch specs and application guidelines for vineyards and orchards are now on-line.
- **Accredited carbon abatement** for facilities (commercial service); and industry wide post application carbon abatement program for the entire industry.

Qld Compost R&D objectives

Johannes Biala, The Organic force

Compost NZ Forum – October '06 Report

Mike Lord

The Compost NZ R&D Strategy is attaches as Appendix 2.

Markets session

Guidelines for using compost in land rehabilitation and catchment management – an overview

Chris Dorahy[1] and Mark Jackson[2]
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In many drinking water catchments surrounding our major cities and metropolitan centres, impacts of development and changing land management practices have been placing increasing pressure on the quality of water flowing into drinking water dams and catchment areas.

For the past four years, the Department of Environment and Climate Change NSW has been working with the NSW Department of Primary Industries and Catchment Management Authorities to develop markets for compost in drinking water catchments. With the research phase complete, partnership programs rolled out with Catchment Management Authorities are now purchasing compost as "standard practice" with major market development gains.

Guidelines have been developed to assist potential users work through the issues that need to be taken into account when considering using composts in catchment management and land rehabilitation. These include: specifying the type and quality of product; understanding the benefits and potential risks; application methods and depths; site considerations; purchasing the products. Case studies from HNCMA are also included to provide users with examples of how composts have been used to rehabilitate degraded catchments. Sections covering regulatory requirements; references, contact details and links are also provided for users of the guidelines who may require further information.

This presentation will review work done to date, and will provide an overview of guidelines developed to inform catchment managers on strategies for successfully using compost in catchment works.

Creating markets for compost in sports turf management

Mark Jackson, Senior Project Officer, Department of Environment and Climate Change NSW, Tel: 02 8837 6010; E: mark.jackson@environment.nsw.gov.au

Over the past five years in most of NSW, drought and water restrictions have made it increasing difficult for managers of Council playing and sporting fields, golf courses, parks and open space to maintain adequate turf cover that is suitable for play. Increasing surface hardness and high turf wear has increased the risk of fall injuries occurring, and some Councils have closed playing fields to reduce potential public liability risks. Closing important community facilities such as playing fields has had significant social impacts as well.

Research suggests that compost used in turf construction and maintenance can improve the sustainability of turf programs, potentially requiring less water and fertiliser, and can reduce soil bulk density and make the surface softer and safer for play.

In partnership with three Councils, NSW Department of Education and Training and the NSW Golf Course Superintendents Association, a series of 18 trials around NSW

have been established to evaluate the performance of compost as a soil amendment in turf construction and as a top dressing in turf maintenance.

Results indicate that compost can play an important role in maintaining the quality of turf under low rainfall conditions, and can reduce surface hardness by up to 40%, making fields safer for play.

The presentation will review the main findings from the trials undertaken, and will highlight the opportunities for the compost industry to market their products in the sustainable management of turf.

Role of composting in biosecurity ii the plant and animal industries

Kevin Wilkinson*, DPI Victoria; Chris Dorahy, NSW DPI and J Biala, Organic Force, Queensland.
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There is a general commitment amongst biosecurity agencies in Australia, New Zealand, USA and Canada to promote more widespread use of on-farm composting of dead stock so that it could be used more effectively to manage future emergency animal disease (EAD) outbreaks. Composting is also a relatively simple and effective process for the routine (ie non-EAD) disposal of farm animal mortalities of all sizes (i.e. from poultry to mature cattle). It has attracted increasing interest due to a general contraction in the availability of rendering services and tightening of regulations governing on-farm burial.

NSW DPI is nearing completion of a trial comparing composting with above ground burial for the emergency disposal of dead cattle. DPI Victoria is similarly planning a simulation and rehearsal of using composting for the emergency disposal of poultry (broiler) mortalities. The trial will be conducted inside a poultry house using the available litter as part of the composting substrate. Another project has been conducted on the routine disposal of dairy cattle in Gippsland Victoria. The project will develop training materials which will be available on a prominent dairy industry website (http://www.dairyingfortomorrow.com/index.php) by the end of October 2007.

Composting can also be a useful tool for the safe disposal of noxious weeds. A trial was undertaken on 35,000 m^3 of aquatic weeds mechanically harvested from the Hawkesbury River after a major infestation occurred in the summer of 2004. The weeds included Alligator Weed, which is invasive on land as well as water. The quality of the compost was found to be comparable to compost made from green organics, though with lower nutrient content, and higher amounts of inorganic material such as sand. Erosion control trials at the Centre for Recycled Organics in Agriculture (CROA) showed that the compost is effective in controlling soil erosion and improving water quality. In addition, pasture establishment in the plots treated with the aquatic weed compost was very good.

Compost for rehabilitation purpose

Dr Jaya Nair, Environmental Technology Centre, Murdoch University, WA.
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The main factors considered for successful composting processes are availability of uncontaminated raw organic materials, right conditions of composting operations to produce good quality product, market for the product and economic returns from the operations. The quality of compost is also critical for agricultural applications.

Rehabilitation of land and soil after mining activities is a major challenge for Western Australia. Considerable area of land and residue deposit areas need to be rehabilitated after mining. The quality of soil is very poor with very high/low pH, very low nutrient and organic content and with low biological properties. Improving the organic content of the soil is important to sustain the planted trees. Addition of chemical fertilisers can result in nutrient leaching to groundwater and also regular application may be required. Application of compost to increase the organic content of the soil can significantly improve the rehabilitation process. However the availability of compost for rehabilitation purpose is a constraint along with its economic feasibility.

A regular source of organic matter is the organic fraction of the Municipal Solid Waste (MSW) and treatment and reuse of this material is a waste management requirement. However this material is inevitably contaminated with inert substances such as glass and plastics, and has elevated heavy metals levels, as well as a potentially large range of chemicals that are present in mixed household wastes. This paper will discuss the possibility of using the compost from MSW for rehabilitation of nutrient deprived soil as a result of mining activities.

Applications session

The effects of recycled organics on soil biological health and their role in building more resilient farming systems

Chris Dorahy[1], Yin Chan[2], Nerida Donovan[1], Fadi Saleh[1] and Lukas van Zwieten[3]
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Farmers are looking at alternative management practices for building up the low organic carbon levels present in many Australian cropping soils. Organic amendments have the potential to improve soil health by increasing soil physical, chemical and biological fertility and subsequent crop and pasture production. Furthermore, applying organic amendments to land has the potential to reduce the reliance of agriculture on inorganic fertiliser inputs, whilst solving issues associated with disposing of agricultural residuals, which represents a more sustainable approach to managing limited global resources.

The objective of this paper is to discuss the opportunities for recycled organics as management tools for improving soil biological health in Australian farming systems by drawing upon the outcomes of a number of research projects undertaken at the NSW Department of Primary Industries Centre for Recycled Organics in Agriculture (CROA). This will be achieved by presenting selected results on the effects of composted soil conditioners and mulches, municipal solid waste compost, grease trap waste and fly ash on soil carbon, microbial biomass, respiration and FDA analyses.

Suppression of soil-borne plant disease using compost.

Matt Ayres, SARDI Plant & Soil Health. Tel: 08 8303 9659, Email: Ayres.Matthew@saugov.sa.gov.au

A plant bioassay was used to determine the feasibility of using compost to suppress soil-borne diseases of greenhouse-grown vegetable crops. Soil was collected from two commercial greenhouses on the Northern Adelaide Plains and was either amended with compost (20% vol/vol) or un-amended (control). Three composts that varied in maturity and feedstocks were used. Tomato, capsicum and cucumber were grown in the soils in pots in a greenhouse for 30 days. At harvest, the percentage of roots showing disease symptoms was assessed. Shoots and roots were separated, dried and weighed.

Plants in the control treatments showed high disease levels. High levels of disease suppression were measured for capsicum in both amended soils and for tomato, in one soil. In that soil, mean root disease was reduced from 82% to 18% for tomato, and from 98% to 26% for capsicum. The level of suppression varied between composts. Increases in plant yield in the compost treatments were also measured.

These results show that composts have the potential to provide high levels of disease suppression in some crops and soil types.

Developing an IPM system for citrus thrips with production and environmental benefits

Peter Crisp and Greg Baker (SARDI Entomology)

Kelly's Citrus Thrips (KCT) feed on citrus fruit, causing cosmetic blemish and market downgrade. Control of KCT currently relies heavily on the use of organophosphate insecticides, which disrupt the natural enemies of KCT and other citrus pests. Losses to the South Australian industry due to quality downgrade and control costs are estimated to be above $10Mpa. Now KCT are developing organophosphate resistance, resulting in more spraying and IPM disruption.

KCT have a pupal life stage that takes place in the soil which creates an opportunity for their control. Earlier SARDI research identified soil-dwelling predatory mites as an important biological control for this thrips pest. KCT pupal mortality is positively correlated with predatory mite abundance, which in turn is positively correlated with soil organic carbon levels. The current study aimed to assess the effect of different compost treatments on KCT biocontrol and a range of crop production statistics. The treatments include various rates of composted forms of animal manure, green waste and grape mark. Two trials, one with Valencia oranges and the other with Navel oranges, are underway.

The first harvestable fruit data was collected in June from the Navel orange trial site, and included yield, weight and diameter of fruit. Using mid-range fruit prices these data indicate that the costs of compost application will be more than offset in the first year alone from increase in income. At current compost decomposition rates it appears that the higher application rates of compost are likely to provide benefits for at least three years. The compost treatments improved water use efficiency, with soil moisture levels under composted trees recorded on average about 25% higher than under untreated control trees. However, any reduction in water usage may well reduce some of the size-yield gains achieved by the higher compost rates.

Compost as part of a vineyard salinity remediation strategy

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In 2003, as part of the National Action Plan for Salinity and Water Quality, the Upper Torrens Land Management Project (UTLMP) began investigating the practical application of strategies to combat salinity. Development of soil salinity, saline water run-off and salinisation of surface waters had been identified as concerns within the Upper Torrens catchment. With support from the Adelaide and Mount Lofty Ranges Natural Resources Management Board, the UTLMP initiated a project to apply salinity monitoring and amelioration strategies in two vineyards.

After preliminary investigations, recommendations were developed. Cultivation, mounding and deep ripping works were undertaken, and soil ameliorants such as lime (up to 4.1t/ha), gypsum (up to 5t/ha) and compost (250m^3/ha) were applied in accordance with recommendations.

Over the period from May 2003 to May 2007, a range of measures were undertaken including soil chemical analysis, soil physical and biological measures, plant growth, pruning weights, yield components and grape quality.

Changes in soil chemical properties were seen in both vineyards, with electrical conductivity reduced from levels approaching those where economic impacts on performance may be seen, to acceptable levels. Changes in exchangeable sodium and calcium will have ongoing benefits for soil structure. On each vineyard, levels of exchangeable sodium undervine were at least halved. Changes were also seen in soil biological properties with up to ten-fold increases in total microbial counts. Populations of earthworms undervine trebled in both vineyards. Steady infiltration rate was increased by 25% at one vineyard, and trebled at the other.

Yield components were monitored on one of the vineyards where Semillon vines had been established for around seven years on a clay-loam soil. At the first monitored harvest, treated vines produced 23% more grapes, due largely to an 18% increase in bunch number. At pruning three months later, treated vines produced an additional 9% in prunings. At the next harvest a 7% increase in yield was associated with a 10% increase in bunch number coupled with a 3% reduction in berry weight. Pruning weights three months after harvest were 15% higher. Based on 2005 grape price data, the yield increases seen would be worth an additional $3,400/ha.

Although the monitoring period was less than three years, water quality data indicated stabilisation of salinity in water flowing out of the property, and at a lower level of salinity.

These results have demonstrated the opportunity for compost processors to promote their product as part of a strategy for remediating a range of vineyard problems such as salinity, sodicity, compact soils and variability. Strategies for deep tillage works, mounding and use of compost for mulching underperforming areas of vineyard have been researched and are well defined. Ongoing research in South Australia will look at the development of ‘flowable’ composts for placement at depth during deep tillage works, and as part of a precision viticulture approach to managing vineyard variability and target compost mulch at the highest benefit areas within the vineyard.

End user session

Agriculture - Challenging the production system

Stephen Harper (PhD, M.Agr.Sc., B.Agr.Sc.)
DPI, Gatton Research Station, Qld. Tel: 07 5466 2222 Email: stephen.harper@dpi.qld.gov.au

During the late 1960s to early 1970s, in response to large population growth, agricultural production experienced massive expansion under what was termed “the green revolution”. The major drivers in this expansion were the newfound technologies, in particular, high analysis nitrogen fertilisers, irrigation, improved genetics and mechanisation. During the period from 1966 to 1990 world cereal production increased from 1.08 billion tonnes to 1.91 billion tonnes. The world cereal production alone will need to increase by a further 1 billion tonnes to feed an additional 2 billion people by the year 2030. A major challenge to agricultural production systems has been the progressive decline in soil quality, and hence yield and profit, and the increasing adverse off-farm impacts on the environment. Addressing soil quality by focussing on managing soil organic carbon levels offers exciting opportunities to not only reverse current trends but to increase productivity while sustaining soil and water resources and reducing offsite impacts. This will require a whole of system approach, and particularly in the intensive irrigated agricultural sectors (such as horticultural production), benefits will be achieved from the use of compost.

Benefits of using compost on the sandy soils of the swan coastal plain

Peter O’Malley*, Bob Paulin. Department of Agriculture and Food Western Australia
Tel: (08) 9368 3313; pomalley@agric.wa.gov.au

Research has demonstrated that using compost will build soil carbon and nitrogen, increase soil volumetric water and cation exchange capacity, stabilise pH and lower bulk density. There is an increase in soil microbial activity and the resulting increase in soil fertility can lead to increased crop yields and quality. Increased yields of transplanted crops can be attributed to an increase in mineralisation of organic nitrogen following bed preparation.
Capturing the benefits of compost on farm requires adjustment to fertiliser and farming practices and results are often clouded by adverse environment, pest and plant disease occurrences and market fluctuations. Increasing the use of compost by growers will require the development and on farm demonstration of profitable compost based production systems.

Compost use in NSW Vegetable production (Not presented)

Alison Anderson, NSW Vegetable IDO

NSW DPI has a Centre for Recycled Organics in Agriculture (CROA) near Camden. Recently, CROA researchers have been involved in compost vegetable trials and identifying markets for composted garden organics. Dr Yin Chan and Dr Chris Dorahy recently spoke at a field day and at a WMAA Compost NSW Seminar. Below is information given at the field day and seminar.

The project 'Quantifying the Benefits of Recycled Organics for Agricultural Cropping Systems' is a collaborative project between NSW DPI and the Department of Environment and Climate Change.

The aim of the project is to demonstrate how compost will produce multiple benefits (yield, environmental and financial) to the production system. Mechanisms to develop new markets for compost (economic incentives, policy drivers, transport arrangements, nutrient and carbon trading schemes and strategic alliances e.g. FIFA) are also being examined.

Part of the project was to identify potential agricultural and horticultural markets for composted garden organics from metropolitan areas to contribute towards the more sustainable use of natural resources in NSW. A report 'Identifying potential agricultural and horticultural markets for composted organics in NSW' was published in June 2005. The report is available from Dr Chris Dorahy (Phone: 02 4640 6443; Email: chris.dorahy@dpi.nsw.gov.au).

The other part of the project is a compost vegetable trial, of which Dr Yin Chan is the principal researcher. The project trial is a multi-season trial. It has been acknowledged that the effects of compost on soils must be considered in the longer term because a derived benefit of compost is the capacity to rebuild soil health over time. This project is examining the effects of compost and the cost benefit of its use over 3 years.

Summary results to date:

Yield

- No difference between conventional practice and compost treatments until 4th crop when
- Significant difference (26% higher under compost treatment with low P compared to conventional practice)

Soil Health

- Compost treatments had significant improvement in soil organic carbon, structural stability and in biological activities. The improvement in biological activities was only observed in the first crop.

Environment

- Compost treatments reduce the rate of P accumulation in the soil.

Continued

Vegetable Soil Testing

As part of the of the preparation for this project, nearly 200 soil samples were collected around the Sydney area and analysed for soil carbon as well as a range of other chemical and physical properties.

Compared to "undisturbed" natural soils, vegetable soils in the Sydney region have:

- Lost 43% C in 0-10 cm layer
- Lower N content in 0-10 cm layer
- Higher pH in 0-10 cm layer

- Higher extractable P in the 0-30 cm layer.

The extremely high P levels down to at least 30 cm were of particular significance. The high levels far exceed the crop requirements and are of significant environmental concern because of the risk of off-site impact via runoff and leaching.

The full results of the soil testing can be found in:
Chan, K.Y. et al. (2007). Phosphorus accumulation and other changes in soil properties as a consequence of vegetable production, Sydney region, Australia. Australian Journal of Soil Research 45, 139–146.

Vegetable Trials

The very high measured P levels in the vegetable soil samples, coupled with problems resulting from the export of nutrients from intensive agriculture, influenced the design of the project.

It was decided that the responses of both soil and vegetable crops to composted soil conditioner would be assessed under both high and low P conditions. The high and low P treatments were intended to test the hypotheses that:

- Farmers can still produce good crops in soils with low P status, and
- Using composts can reduce P loading and maintain or improve crop productivity in soil with high P status.

Parameters measured in the trials:

1. Crops – growth, yield, water and chemical use, diseases, weeds.
2. Soil – organic carbon, physical quality (infiltration rate, soil strength, structural stability), chemical quality (nutrient status, pH, EC) and biological quality (microbial activity and earthworm population).
3. Water – leachate and runoff quality.

As of June 2007, there have been four crop rotations – broccoli, eggplants, cabbages and capsicums.

For more information about the vegetable trials please contact Dr Yin Chan (Phone: 02 4588 2108; Email: yin.chan@dpi.nsw.gov.au).

Data from the trials will soon be published. A paper will appear in the November edition of the Australian Journal of Experimental Agriculture.

RO Product production session

Some New developments in organic waste recycling R & D: Odour control, fly breeding control, heavy metal reduction, compost quality, carbon credit potential.

Dr Harrie Hofstede, Spartel, Perth WA. Tel: 9360-6699, Email: spartel@iinet.net.au

The speaker will present results from a range of R & D projects. He will present the following:

1. Results of effective odour emission reduction technology and strategies which were successfully tested on poultry litter processing achieving a 90% reduction.

2. Results of research in controlling and reducing mobility of heavy metals in MSW and other compost products.

3. Results of fly breeding reduction research in poultry litter processing (90%)

4. Case study of an organic waste CDM (carbon credit) project in Bangladesh.

The research results will be presented in brief overview format and allow further discussion following the presentation.

Vermiculture Revolution: Rapid Composting of Waste Organics With Improved Compost Quality For Healthy Plant Growth While Reducing Greenhouse Gas Emissions

* Rajiv K. Sinha & Gokul Bharambe **
School of Engineering (Environment), Griffith University, Nathan Campus, Brisbane, QLD- 4111

A revolution is unfolding in vermiculture studies (rearing of earthworms - Charles Darwin's 'unheralded soldiers' of mankind) for waste and land management, improving soil fertility and promoting sustainable agriculture. Some earthworm species are versatile waste eaters and bio-degraders and feed on variety of organic wastes. Vermiculture is a self-promoted, self-regulated, self-improved & self-enhanced, low or no-energy requiring zero-waste technology. It excels all 'bioconversion' & 'biodegradation' technologies by the fact that it can utilize organics that otherwise cannot be utilized by others. It excels all 'bio-treatment' technologies because it achieves greater utilization than the rate of destruction achieved by other technologies. It involves about 100-1000 times higher 'value addition' than other biological technologies. Earthworm participation enhances natural biodegradation and decomposition of organic waste from 60 to 80 %.

Vermi-compost is a nutritive plant food rich in NKP (1.16 % nitrogen, 1.34 % potassium and 1.22 % phosphorus), micronutrients, beneficial soil microbes like 'nitrogen-fixing bacteria' and 'mycorrhizal fungi', and also contain growth promoting hormone 'auxins' and flowering hormone 'gibberlins'. It also contains some antibiotics and actinomycetes which help in increasing the power of 'biological resistance' in crop plants against pest and diseases. Vermicompost also contain enzymes - amylase, lipase, cellulase and chitinase, which continue to break down organic matter in the soil to release the nutrients and make it available to the plant roots. Earthworm activity is so prolific that, on average, 12 tonnes / ha / year soil or organic matter is ingested by them, leading to upturning of 18 tons of soil / year.

A major issue of concern today is emission of greenhouse gases (especially methane) during composting. Vermicomposting by earthworms decrease the proportion of 'anaerobic to aerobic decomposition' due to burrowing actions, resulting in a significant decrease in methane (CH4) and volatile sulfur compounds which plague most conventional composting processes. Vermicomposting can play important role in the strategy of GHG reduction and mitigation in the disposal of global organic wastes as landfills also emit methane.

** Research Assistant
Works in Vermiculture is being carried out at the School of ENG, Griffith University, Brisbane, under the supervision of Dr. Rajiv Sinha & the stewardship of Prof. Bofo Yu, Dy. HOS (ENG-EVE)

Day 2 Program, R&D Forum

7.30	**Breakfast at Club Murdoch** 'Challenging how we view the role of agriculture in recycling organics' & beyond – *Bob Paulin*
9.00 [15]	**1. Introduction to break-out sessions** (Andrew Huffer) Objective ▪ Develop R&D project and/or implementation plans to meet key industry needs Background ▪ Needs linked to R&D themes identified at previous forums & the National Market Development Plan ▪ Focusing on R&D Industry needs ▪ MARKETS: addresses barriers to market development in priority markets (application techniques, transport etc) ▪ END-USER: identifies end-user needs and issues (basically market research) ▪ APPLICATIONS: develops innovative applications for compost (suppress disease, save water and store carbon etc.) ▪ STANDARDS: targets improvement of product standards and regulations (better product testing, appropriate limits etc) ▪ PRODUCTION: Production/waste treatment R&D (faster composting, odour management, contamination reduction etc.)
9.15 [20]	**2. R&D knowledge barriers** Process ▪ Angus to present summary identifying market development priorities based on information from the online survey ▪ Whole group to identify knowledge barriers (**Appendix 1 - Template 1**) for the key markets identified by the survey ▪ Also identify whether these require 'New Knowledge' (R&D) or 'Communication of Existing Knowledge' (Extension-based processes) to be addressed.

	Day 2 Programme continued:
9.35 [70]	**3. Priority R&D areas** **WORK IN GROUPS** Process ▪ Split into 5 groups based on area of industry need above (1) ▪ Each group to select group leader (facilitator), scribe & reporter ▪ Maybe one 'industry' person to sit with each group to clarify or highlight the needs? ▪ Each group to use a template (provided) ▪ Review each 'Area of work' & identify if it requires 'New Knowledge' (R&D) or 'Communication of Existing Knowledge' (Extension-based processes) to be addressed (**Appendix 1** - Template 2)
10.45	**MORNING TEA** 
11.15 [30]	**4. Prioritisation of R&D** **WORK IN GROUPS** ▪ For each area of work identified, decide it is a High or Low Commercial Imperative AND whether there is a High or Low R&D capacity to carry it out! (**Appendix 1 - Template 3**) ▪ Issues placed in Quadrant 1 (High Commercial Imperative and High R&D capacity) should be the one that we develop project proposals for
11.45 [45]	**5. Develop project proposals** **WORK IN GROUPS** ▪ Group participants to develop project proposals for each issue in the High Commercial Imperative and High R&D capacity quadrant using template provided
12.30 [60]	**LUNCH** **(**Includes time for participants to get re-seated at break-out tables)
1.15 [60]	**6. Develop project proposals** **(Continue IN GROUPS)**
2.15 [30]	**7. Presentation of project proposals** ▪ Develop an action plan for the projects identified ▪ It's vital that specific people or groups are identified to ensure the actions become a reality ▪ Encourage the participants to be part of this solution/action plan and have an active role in the implementation phase ▪ Choose a volunteer to make a 7 minute presentation to the Forum
2.45 [15]	**8. Forum summary & close**

Breakfast talk at Club Murdoch

Challenging how we view the role of agriculture in recycling organics' & beyond

Bob Paulin

- Agriculture is a pivotal LONG TERM market

- UNDERVALUED importance of Agriculture:
    1. To the urban community (waste, food, employment, business, social environmental values)
    2. Within a productive rural environment (Land Use planning issue)to the Urban community

- Talk will cover organics collection; management of soil quality; food production and community benefits;

Organics collection and product management options

- Organic waste management needs to focus on QUALITY REQUIREMENTS for product users –those who attended the DICOM visit will recall quality discussions with Tom Rudas

- Within an integrated waste management planning process - Source separation MUST become the primary objective of organic waste management – important implications for process management, contaminant levels and risk management

- MSW and other technologies have roles for managing inevitable organics that can not be separately collected. MSW collection and processing MUST not be the primary focus of an organics management plan

Importance of soil

- Need to recognise importance of improving and maintaining soil quality – support embedding in Government sustainability policy

- Waste hierarchy and energy from waste – Recycling organics can be complemented by energy recovery BUT primary focus needs to be on maximising return of biologically useful carbon to the soil, NOT energy recovery

- Must use technology intelligently (biochar; not a silver bullet BUT may be a useful adjunct to composting) –

- A point of philosophy to consider. We 'MAN/Woman' need to focus on supporting natural systems, not subjugating them to our will. There is a potential danger in our desire to manipulate the basis of natural systems, the genome – It would be safer for US to view our position in the natural

order as one of great privilege and responsibility that confers a the 'most privileged position' of being its guardian

Food production and community

- Add to Stephen Harpers 'next green revolution' comments yesterday, BUT shift the focus from grain to local fresh food supply. An important element of sustainable community and society should/must be to 'Maximise the capacity to provide fresh local food' and in achieving that, grain will become increasingly important for biofuel - rather than bread!!

- Benefits of natural vs processed food and importance of food nutrition

- There is a real need to focus research on producing nutritionally dense food – so what!

- Managing productivity and food quality is about managing SOC and GUESS WHAT, SOC is about using RO Products

Some considerations:
1. Declining nutritional benefits of our fresh food is a reality – organic foods better for us, nutritionally

- 2. Our work has began to demonstrate that managing SOC reverses production decline in carrots
  3. We are a biological machine – no amount of rhetoric about exercise will replace the need for good fuel!
  4. health care is rapidly approaching an unsustainable proportion of GDP and the next generation is likely to live less than this generation??

- Farmers will not use compost under current cost structures – need to make it indispensable

- Need to develop broader strategic focus for future R&D, and establish how to integrate the use of RO products into practical and more productive approaches to management. Remember that:

  1. Most of the simple problems have already been solved and the solutions will facilitate the development of better farming systems

  2. There is no limit to what can be achieved if no one has to take credit – *Robert Woodruff*

A FINAL THOUGHT – 'The aim of a argument or discussion should be progress, not victory' – Joseph Joubert (1754-1824) French philosopher

Workshop outline – Andrew Huffer, facilitator

Objective

Develop R&D Projects and / or implementation plans to meet key industry needs

Areas of industry need were developed and refined from previous Compost Australia R&D forums and a survey of market priorities was organised in conjunction with the registration process for the R&D Forum.

Project proposals were developed in areas of industry need by five groups:

- Markets Group 1
- End-user Group 2
- Applications Group 3
- Standards Group 4
- Production Group 5

R&D knowledge barrier Identification

Priority Markets

These were derived from an electronic survey conducted by Compost Australia prior to the forum.

	Queensland	New South Wales	Victoria
1	Vegetable production	Mine Site Rehabilitation	Landscape contractors
2	Grain production	Vegetable production	Retail garden (bulk)
3	Erosion Control	Catchment Rehabilitation	Vegetable production
4	Turf grass growing	Erosion Control	Mine Site Rehabilitation
5		Public Parks & Gardens	Viticulture

	South Australia	Western Australia	OVERALL
1	Vegetable production	Landscape contractors	Vegetable production
2	Viticulture	Vegetable production	Viticulture/fruit
3	Fruit growing		Rehabilitation
4	Contaminated sites		
5	Mine Site Rehabilitation		

Knowledge barriers

Knowledge barriers were developed by all the participants in a single group. Identifying whether they could be addressed with existing or required new knowledge was limited by time restraints.

Barriers	Communicate Existing Knowledge	New Knowledge
VEGETABLES		
Lack of a acceptable/useful measure of compost quality (including maturity, disease suppression)		Y
We lack and end-user specification for compost products that meet their needs	Y	Y
Value proposition not clear - do cost benefit analysis (region by region)		Y
Limitations in production capabilities - don't have (or use) processing criteria for a product to Vegetable production	Y	
We don't have sufficient mechanism for defining the edge of knowledge - not integrating results of trials	Y	
No mechanism for the research trials and reporting protocols to be consistent (including prod characterising)	Y	
Don't apply consistent terminology within the research community	Y	
Don't know if need and can we practically produce cross-commodity compost products?		Y
Do not have a sufficient understanding of grower needs (growers not sure what they need)		Y
Insufficient understanding of disease suppression characteristics of compost in vegetable production.		Y
Not sure of nutrient contribution and rate of release over time		Y
Don't have quantification of irrigation savings in a variety of applications and soils		Y
Don't have quantification of liming/soil conditioner value in a variety of applications and soils		Y
Don't have the tools to integrate compost use into the production system and how it changes their management practices	Extension	Y
Don't know whether there is capacity to value add compost products (economic viability)		
Cost effective methods of application not fully		

developed		

Barriers continued	Communicate Existing Knowledge	New Knowledge
FRUIT/VINEYARDS		
Don't know economic advantages of using the material for vine establishment		
Need to assess vine growth and vigour to look at vine shading bunch growth		
Can't actually quantify water savings - quantification required		
Not using precision viticulture techniques to help guide compost application		
Critical -no agreed method for analysing characterising compost texture (specific to mulch)		
Don't know how compost application works with other soil additives (eg lime)		
Insufficient knowledge of disease suppression in vines from composted mulch		
Integrated vineyard floor management system - don't know how compost fits in.		
Soil temperature moderation - don't know how compost fits in (must characterise distribution of roots)		
Don't know how nutrient contributions compare between competing products and compost		
Not analysing a wide enough range of parameters		
Don't understand the beneficial bacteria, fungi and other microfloura and their contribution to benefit of compost products		
Don't understand maturity - similar to vegetable situation		
Don't understand the long term benefits to the growing system		
No work in Australia on Olives		
Don't understand compost benefits relating to dealing with frosts		
Blending compost with other organic additives (Char, vermicast)		

Barriers continued	Communicate Existing Knowledge	New Knowledge
REHABILITATION		
Understanding logistics of supply - logistical evaluation		y
Don't sufficiently understand that nature of the market and it's needs - show cost vs benefit		y
We lack and end-user specification for compost products that meet their needs	y (extension work)	

Projects proposals

The titles of the project proposals developed at the Day 2 workshop are listed in the table below.

Project		Industry need	
No.	**Title**	**Area**	**Group No.**
1	Field research	Markets	1
2	Grower support - Industry development officer	Markets	1
3	Towards zero physical contamination	Markets	1
4	Develop cost-effective compost-based production systems	End-user	2
5	Quantify benefits of compost use	End-user	2
6	Substantiation/development of the effects of compost extracts	Applications	3
7	Compost extracts disease suppression across several crops & pathogens	Applications	3
8	Refine and adapt nutrient calculator	Applications	3
9	Precision compost use	Applications	3
10	RD&E standard protocols	Applications	3
11	Minimum basic compost parameters for specific application products	Standards	4
12	Integrated management of Recycled Organics	Production	5

Working in groups provided opportunity to discuss in more depth the key R&D opportunities for the Compost industry in Australia

Based on considerations of the issues facing the development of the compost industry, each group initially identified the areas of R&D required, prioritise these and develop draft project proposals for the high priority areas

Marketing - GROUP 1

Participants

Name	***Organisation***
Ivan Unkovich	Water Corporation, WA
Andy Gulliver	Custom Composts
Mike Lord	Perry Resources Ltd
Katie Webster	Compost for Soils
Darren Bragg	Department Of Environment And Climate Change NSW
Angus Campbell	ROU

- Identify markets with greatest potential
- Develop cost benefit analysis
- Training, certification, branding-Train key people
- Product differentiation from competitor products
  – manures, fertilisers

Potential areas of work

Potential project area	New knowledge	Communication of existing knowledge	Priority*
Achieving zero contamination; contamination removal leading to improved performance of practices technologies and cost			
RD&E standard protocols			
Grower support and commercialisation (RDO)			
On field research to fill gaps			

Marketing project proposals

1. Field research

Background:

- Identify specific needs and priorities of markets
- Develop product specifications that target growers needs
- Develop key product performance data that relates directly to grower value

Scope:

-

Aims

- Validate performance-based product specifications
- Quantify nutrient release and availability over time
- Quantify soil conditioner value of compost (as a lime and gypsum substitute)
- Quantify irrigation water savings
- Quantify reduction in crop stress and increase in farm incomes

Objectives

Deliverables

- Report in the context of established national field trial protocols
- Report and case studies using standard grower value framework

Critical resources required

-

Team members

-

2. Grower support – Industry Development Officer

Background:

- Growers need direct assistance to integrate compost application into farm management practices to maximise benefit and value for the grower, and to minimise risks.

Scope:

- Research into practice.
- Direct support for key growers.
- Liaise with agricultural sector consultants (not directly selling product).

Aims

- Work directly with key growers and regional grower groups to integrate compost into the grower systems.
- Identify and work directly with key growers to establish successful management practices.
- Document successful management practices.
- Promote practices to growers and DPI field offices, consultants etc.
- Refine and validate performance-based product specifications.
- Monitor and report on product performance.
- Identify and document optimum outcomes arising from targeted performance based products and successful management practices.
- Liaise with equivalent compost IDOs & researchers in other regions.

Objectives

-

Deliverables

- Report using established national field trial protocols.
- Reports and case studies to use standard grower value framework.

Critical resources required

- Position description and clearly defined roles
- Clear objectives and scope, agreed performance outcomes
- Role of IDO in relation to compost sales (distribute a list of compost suppliers).
- Clear reporting relationship.
- Documented and explicit decision making process.

Team members

-

3. Towards zero physical contamination

Background:

- Physical contamination of compost is a barrier in some markets
- The efficacy and cost associated with removal of physical contamination is not clearly understood
- Revealing costs and efficacy enables identification of user pays or polluter pays solutions

Scope:

Aims

1. Identify physical contamination removal, intervention points in the supply chain and production cycle
2. Identify technologies and practices for removal of problematic physical contaminants
3. Physically assess and quantify the capital and operational cost per tonne of material and operational efficacy of each of the identified technologies and practices
4. Identify the most cost effective combinations of technologies and practices and the operational and realistically achievable physical contamination target
5. Work with state and local government to realise universal increase in gate fee to enable financially viable achievement of targets
6. Integrate the lower contamination specifications into product standards

Objectives

Deliverables
- Realistic expectations
- Polluter pays for improved product quality

Critical resources required
- Commercial sensitivity
- Funding and intelligence
- Participation of commercial processors and equipment manufacturers

Team members
- Angus Campbell
- Darren Bragg
- Katie Webster
- Mike Lord
- Andy Gulliver
- Ivan Unkovich

End user - GROUP 2

Participants

Name	Organisation
Roxanne Blackley	Taroom Shire Landcare Group Inc
Stephen Harper	DPI Queensland
Peter O'Malley	DAFWA
Kevin Wilkinson	DPI Victoria
Bob Paulin	DAFWA

- Incorporating compost use into crop production
- Effective rates
- Identify key benefits – soil carbon, water quality, irrigation efficiency
- Risk assessment associated with odour, contaminants
- Develop rehabilitation systems – salinity, degraded soils

Potential areas of work

Potential project area	New knowledge	Communication of existing knowledge	Priority
Develop cost-effective compost-based production systems and tools	√	√	High-High
Develop specifications for different end-users (Compost quality – what to measure, how to measure and how to interpret)	√	√	High CI Low R&D

Develop strategies for using compost – rates, frequency, methods, "do's & don'ts"	√	√	High CI Low R&D
Quantifying benefits of using compost, (ie nutrients, irrigation) across a range of soil types and compost quality	√	√	High-High

End user project proposals

4. Develop cost-effective compost-based production systems

Background:
- Demonstrated positives in research but limited uptake by growers
- Compost not frequently integrated into production systems
- Growers have difficulty in adjusting fertiliser management practices

Scope:
- One site in each state based on priority crop/market
- Three-five years

Aims
- Increase agricultural compost markets

Objectives
- Engaging end-users in identifying drivers to bring about change
- Develop improved farming systems incorporating compost

Deliverables
- Implementation model, tools & packages for development of compost-based farming systems (so it can be used in multiple market sectors)
- Potential to roll out as a program for market development

Critical resources required
- Development officer in each state
- Expert panel (from around Australia)
- Technical support
- $220K + per year in each state

Team members
- Bob Paulin
- Peter D
- Kevin W
- Stephen Harper
- Roxanne

Lead person: Bob Paulin; Kevin W

5. Quantify benefits of compost use

Background:
- Nutrient irrigation, liming potential of compost x soil type
- Critical to farmer and consultant decision making
- Lack of understanding of processes necessary to predict outcomes

Scope:
- Multidiscipline single location research program for vegetables
- Links with current and existing work
- Three years

Aims:
For key vegetable soil types:
- Define and quantify N, P, K and liming value
- Define and quantify irrigation savings

Objectives
- Validate quality criteria of compost
- Quantify the amount of N & P supplied to crop
- Quantifying liming effect and water saving

Deliverables
- Informed fertiliser recommendation
- Verified irrigation savings
- Known liming effect (lime calculator)

Critical resources required
- Research officer/Leader
- PhD student

Team members
- O'Malley/Angus Campbell
- Dan Murphy/Lyn Abbott

Lead person: Dan Murphy

Applications - GROUP 3

Participants

Name	Organisation
Matt Ayres	SARDI
Johannes Biala	Organic Force
Chris Dorahy	NSW DPI
Alice Palmer	TIAR
Peter Wadewitz	Peats Soil & Garden Supplies

- Soil quality / carbon building – soil structure
- Nutrient cycling – N mainly
- Pest & disease management

- Innovative approaches

Potential areas of work

Potential project area	New knowledge	Communication of existing knowledge	Priority*
Substantiation/development of the effects of compost extracts			
Compost extracts disease suppression across several crops & pathogens			
Refine and adapt nutrient calculator			
Precision compost use			
RD&E standard protocols			

Application project proposal

6. Substantiation/development of the effects of compost extracts

Background:

- Many claims about the effects of compost extracts on soil properties and crop yields. This is a threat and an opportunity for the industry.
- To be able to dismiss the claims or embrace the benefits we need to test and validate the claims

Scope:

- Desk top study and obtaining existing information
- Contact practitioners

Aims

- Investigate trial data obtained in Australia (anecdotal, scientific and demonstration)
- Run small-scale trials

Objectives

Deliverables

- Report

Critical resources required

- Staff (part time)
- Pot trial capabilities
- Compost extracts
- $10-%30K

Team members

- Johannes Biala
- Roxanne Blackley

Lead person: Johannes Biala

7. Compost extracts disease suppression across several crops & pathogens

Background:

- Aerobic Compost Extract (ACE) standardisation in Tasmania completed for vines as well for bunch rot and powdery mildew
- Potential to produce another marketable compost product
- Reduction in fungicide used & fertiliser application

Scope:

- Use ACE produced according to the protocol for disease suppression in vines on powdery mildew and botrytis bunch rot and apply the standardised ACE to other crops and pathogens

Aims

- Produce standardised ACE for maximum suppression of a variety of pathogens on a variety of fruit and vegetable crops in Tasmania
- Measure disease suppression
- Measure fruit and vegetable yield, pH, brix, titratable acidity, human pathogens (?) and longevity of microorganisms on the fruit leaf surface to identify how close to harvest can ACE be applied
- Number of applications, various compost ingredients
- Broad acre and using on-farm equipment (survival of microbes)

Objectives

Deliverables

- ACE use a cross wide range of crops to increase production and improve quality
- Reduce fungicide use (IDM)
- Reduce nutrient application

Critical resources required

- ACE production plant
- Compost quality analysis
- Field sites
- Demonstration - extension and reports articles in magazines and scientific publications
- Full-time researcher (18 months)
- Casual for field trials
- $250-$300K
- Funding through AusIndustry, Commercial Grant

Team members
- Dean Metcalf
- Alice Palmer

8. Refine and adapt nutrient calculator

Background:
- NPK nutrient calculator developed by ROU based on best available knowledge, information & overseas research
- Valuable tool for growers in industry but need to validate assumptions for site-specific situations (soil type, compost type, climatic and rainfall regimes)

Scope:
- Test a range of compost under varying soil types and climatic regimes in to examine its effect on N, P, K mineralisation and availability

Aims
- Examine the effects of soil type, compost type, climate and rainfall on N,P, K mineralisation and availability from compost
- Refine and adapt the existing ROU compost nutrient calculator

Objectives

Deliverables
- Improved understanding of nutrient cycling and availability from compost across a range of Australian conditions
- Revised and updated nutrient calculator
- Improved tool for compost suppliers and end-users for understanding nutrient value of compost and encouraging market and development

Critical resources required
- Laboratories for characterising compost and undertaking mineralisation studies under controlled conditions
- Analysis of soil samples
- Field sites (5-6) across Australia for undertaking studies under field conditions (if initial data provides insufficient information)
- Pot or field trials
- $300K over three years
- Potential funding through HAL or RIRDC

Team members
- Chris Dorahy NSW DPI
- Simon Elridge
- Pete Wadewitz (Industry rep)
- Angus Campbell (ROU)

- Collaboration across SARDI, Vic DPI, QDPI, DAFWA

9. Precision compost use

Background:
- Broadcast compost used to change soil properties is often too expensive for farmers and may not be necessary to achieve the desired plant response
- Precision compost application, exactly where plant roots are may be sufficient

Scope:
- Literature review
- Field trials

Aims
- Evaluate whether precision compost use delivers desired plant response equal or better to broadcast compost use
- Demonstrate economic effects
- Develop application equipment

Objectives

Deliverables
- Literature review to identify effects and application technology
- Trial results that inform about efficacy of precision compost use (application rates)
- Tested application equipment (co-operation with engineering company)

Critical resources required
- Staff time
- Field trial sites
- Engineering company

Team members - Johannes Biala

10. RD&E standard protocols

Background:
No consistent approach to planning characterisation, implementation or documentation of field trials, which limits subsequent use of outcomes and integration of outcomes from different trials

Scope:
Maximise the collected benefits and use of research projects to the sector

Aims

Specify standard:
- Market context location and size; needs objectives and priorities
- Characterisation of soil and climactic or environmental conditions
- Site information to develop improved farm management practices

Trial objectives:
- Commercial objective of the trial
- Grower selection criteria (for product characterisation template
- Grower value framework
- Guidance on the experimental design
- Define categories of trial
- Basic parameters that should be monitored for each type of market
- Identification of how treatments were varied with respect to key parameters (nutrient, soil condition, herbs and pests, irrigation, quality and yield)
- Description of how the application will be assessed for economic viability
- Case study template and checklist

Objectives

Deliverables (online)
- Protocols and templates as specified
- Database of results from trials
- Specified for incorporation into engagement contracts and grant proposals

Critical resources required
- Engage and fund project (industry)
- Matching funds (HAL)
- Need to complement the R&D forum funding
- Potential funding through HAL or RIRDC

Team members
- ROU
- Katie Webster, Bob Paulin, Kevin W, Chris Dorahy; Pam P, Matt Ayres

Standards - GROUP 4

Participants

Name	Organisation
Dennis Baker	Compost Qld
Angus Johnston	WMAA
Maria Sevo	Richgro

- Product specifications to meet market requirements
- National consistency
- Minimum standards to protect environment, biosecurity

- Integration with industry improvement programs including quality

Potential areas of work

Potential project area	New knowledge	Communication of existing knowledge	Priority*
Maturity index - method and standards. Is it safe to use	√		High-High
NDI establish the validity & relation to maturity	√	√	High R&D Low CI
Available NPK during maturity & fertiliser value. Short and long-term	√		High-High
Frequency of product testing and cost minimisation for specific applications	√	√	High R&D Low CI
Minimum basic testing indicators for product quality	√		High-High
Expanding role & activities of technical committee (more frequent review mechanisms of relevant standards)		√	Low-Low

Standards project proposal

11. Minimum basic compost parameters for specific application products

Background:

- Existing testing is based on AS 4454 and there is a need for product quality testing parameters for the specific applications

Scope:

- Specific application of composting product should meet basic quality parameters. The project must link with the product development process & template (Victoria)
- Specific applications for vegetables and fruit and other priority markets
- Should be a joint project with an end-user group

Aims

- To satisfy customer's needs for the quality product, application
- To ensure that the finished product quality is fit for purpose
- To minimise the cost of product testing
- Meet customer information needs

Objectives

- To increase the practicality of analytical testing and quality management processes
- Improve consistency of products
- Understand grower and end user information needs in terms of analytical testing
- Combine existing analytical testing information and interpret

Deliverables

- Revised analytical testing schedule for each priority market
- Technical paper providing a case for revised testing in target markets
- Presentation suitable for use with standards committee and certifier

Critical resources required

- Access to accredited laboratories
- Access to past testing data in priority markets
- Variety of samples from application specific products
- Grower and end user, reference group
- Must understand that soils where products used

Team members

- Dennis Baker, Pam
- Garry Kimble
- Maria Sevo

Nick Kopsatis

Production - GROUP 5

Participants

Name	Organisation
Dr Rajiv Sinha	Griffith University
Dr Jaya Nair	Murdoch University
Greg McGuire	EnviroFert NZ

- Maximising composting efficiency
- Planning issues including transport corridors
- Feedstock management & collection
- Processing systems, odour management

Potential areas of work

Potential project area	New knowledge	Communication of existing knowledge	Priority*
Source separation, minimise contamination	√	√	High-High
Community education & communication.	√	√	Low-Low

Surveys (strict collection procedures) School education			
Economy of scale to get consistent quality product			High-High
Value added products - high temperature treated product, compared to biologically active product	√	√	High-High
Bio energy production from composting anaerobic digestion producing CH_4 & H_2	√		High-High
Bio-ethanol from agricultural waste			
Process standardisation with different RO			Low-Low
Closing the loop for RO -> energy, water & food production, GHG, Carbon sequestration, bioremediation using composting, vermi-composting and anaerobic digestion			High-High
Scale of operation for economic viability	√		
Greenhouse gas emission and environmental benefit on vermi-compost production	√		
Integrating vermi-composting with greenhouse gas production, CO_2 and nutrient recycling	√		
Marketing of products	√		
Transport forms of the end product	√		

Production project proposal

12. Integrated management of Recycled Organics

Background:

- Recycled organics (RO) management should be an integrated approach with simple, low-cost technology with a closed-loop approach where appropriate

Scope:

- Attain proper waste management
- Recycle nutrients, water and energy
- Closing the loop approach in RO management
- Improve the quality of the whole system of RO management

Objectives

- To recycle nutrients through various treatment processes
- To deliver more than two outputs from the process

- To study environmental benefit in terms of Greenhouse Gas (GHG) and carbon sequestration and waste management
- To scope the benefit in terms of dollars
- To have a multidisciplinary collaboration approach

Aims

- Closing the loop for RO management, incorporating nutrient, water cycle for compost & value-added production, GHG abatement, carbon sequestration, bioremediation using composting, vermi-composting and anaerobic digestion

Deliverables (via demonstration project)

- Compost & value-added products, energy
- Environmental benefits (GHG, landfill diversion, C sequestration)
- Economic benefits
- Sustainable waste management

Critical resources required

- Human resources (Research scholarship; Project management)
- Laboratory facilities & expenses
- Travel expenses
- Collaboration with RO receiving facility

Team members

- Dr Rajiv Sinha
- Mr Gary McGuire
- Dr Jaya Nair

Lead person: Dr Jaya Nair

Appendix 1 – Workshop templates

Template 1: Knowledge barriers (Session 2)

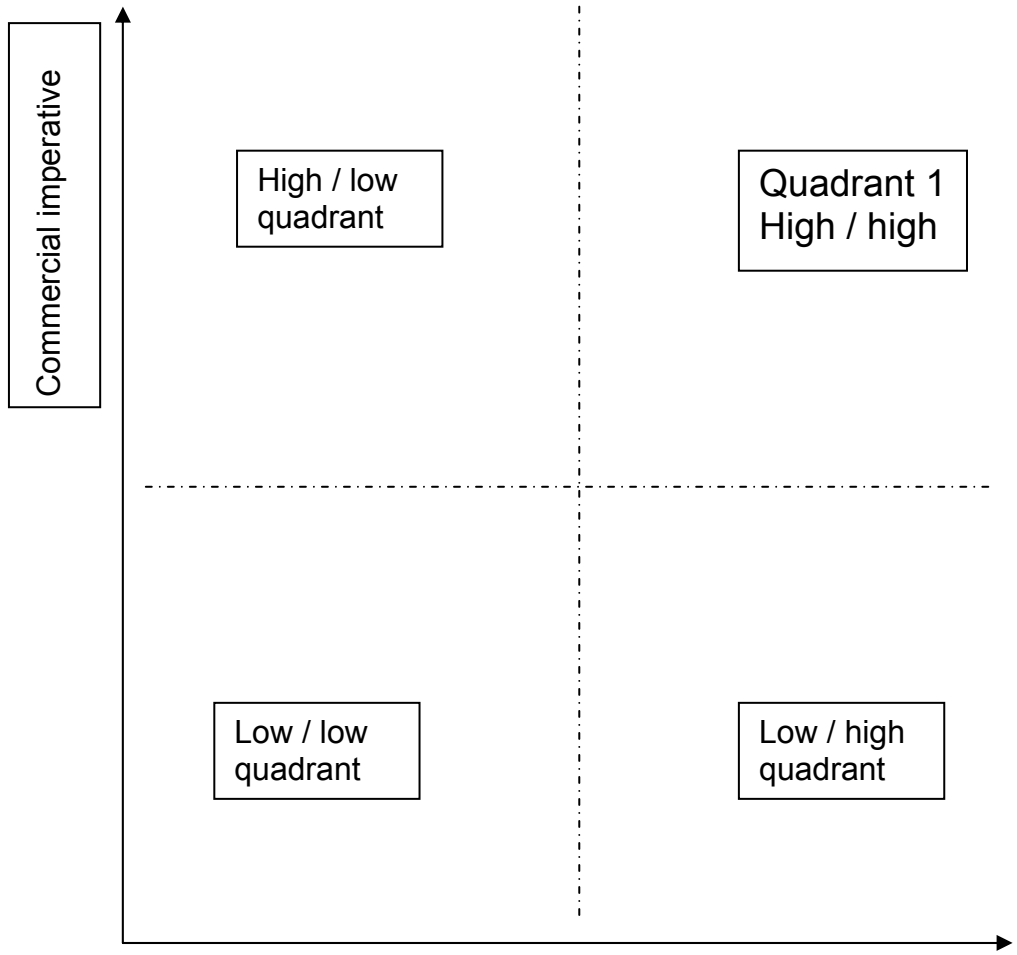
State	Priority Market	Knowledge barrier	New knowledge	Communication of existing

Template 2: Potential areas of work (Session 3)

Potential area of work	New knowledge	Communication of existing

Appendix 1. Continued:

Template 3. Prioritisation grid



Appendix 2. NZ R&D Report

WASTE MANAGEMENT INSTITUTE OF NEW ZEALAND

An R+D strategy

COMPOST NEW ZEALAND

Milestone 2 1 R&D

November 2006

Contents

1. Introduction

Compost NZ was formed in 2005 to represent all aspects of the organic recycling industry. Organisations involved with composting, anaerobic digestion, vermiculture and other organic recycling technologies are all intended to derive benefits from participating in Compost NZ.

This research strategy is a part of the 2006-7 work programme and is intended to provide a framework for setting out research priorities over the next five years. The strategy will also help to provide direction for those involved with research programme governance and making funding decisions.

2. About the Strategy

2.1 Vision and outcomes

To secure lasting improvements in research capacity for the organic recycling sector and deliver quality cost-effective commercially relevant research.

Three interconnecting outcomes support this vision:

- Effective consultation between industry participants, research and funding agencies and markets
- Appropriate research governance
- Effective delivery of research outcomes to industry participants and end users

2.2 Purpose of this strategy

The strategy is intended to do two things. Firstly to provide an overarching direction for research and development in the organic recycling sector. Secondly, to provide a commercially driven research and development agenda to be worked on over the next few years.

A commercially relevant approach to research and development for the organic recycling industry is important diverting organic resources from landfill. Achieving satisfactory diversion rates is key to the New Zealand Government achieving its targets in the New Zealand Waste Strategy.

2.3 The challenge - shaping change

Organic recycling is a relatively new industry in New Zealand. Breaking into markets for products is not easy – particularly when they are reinforced by dedicated and entrenched government research capacity and advisory services all backed by industry R+D resources with strong end user delivery mechanisms.

Our challenge – partially through this strategy is to encourage some change. To do this means considering the issues facing the industry set out below and working to address these:

2.3.1 Industry working together

The immediate focus of Compost NZ is to mould New Zealand policy covering collection, processing, research and development, market use, training and education. This strategic direction should eventually lead to further development of the industry. *Regional and national co-ordination of these activities is integral to whether industry development can take place.*

2.3.2 Current R+D in New Zealand

Research is an important component of helping the organic recycling industry to grow. Current research is piecemeal, defined by research institution capacity and interest or directed by immediate short term commercial imperatives. Major research funding organisations and central government agencies have no coherent strategy in place for research in organic recycling. Given the focus of research in fertilizer dependent growing systems, *justification for organic recycling research will need to be robust.*

2.3.3 Research and development forum – key aims

A research and development forum was held in October 2006. The theme for the forum was: -"recycling organic materials into sustainable agricultural and horticultural production". The day was intended to provide an opportunity for researchers and industry participants to discuss research for the sector. *Key aims* for the forum were to:

- Discuss current NZ research
- Learn from experience within the sector and draw on Australian expertise
- Develop a working network
- Identify knowledge gaps and strategic priorities
- Start an R+D plan for the sector (this strategy)

3. The Industry

The organic recycling industry in New Zealand involves private business, local councils and partnerships between councils and business. The industry is wide in scope and involves:

- Household greenwaste collection
- Commercial greenwaste collection
- Commercial organics collection (bio-solids, animal wastes, animal processing, wood products)

- Windrow composting
- In vessel composting systems
- Vermiculture
- Mulches
- Soil conditioners

Local government and private sector spending on organic recycling operations is approximately XXX million each year.

Organic recycling operations employ approximately XXX employees

3.1 Key features of compost operations and markets in New Zealand

Markets for bagged product are becoming saturated. There is a proliferation of cheap bagged products. There are still opportunities for sales in the bulk compost market – particularly at the high quality end of the market. For commercial operators, the target market is intensive horticulture and agricultural production.

Council processing facilities are driven by avoiding higher landfill costs Influences on profitability are landfill gate fees which vary from $20/tonne - $136/tonne. Organic collections fees vary from $0 - $35/tonne garden $94/tonne.

3.2 Market Development Objectives - implications for research requirements

In the South Island commercial operators consider the market for composted soil conditioner used on irrigated dairy / crop production (potatoes) to be a primary focus. Mulch for viticulture will also be a useful end market.

In the North Island commercial operators also consider the market for composted soil conditioner used on irrigated dairy / crop production (potatoes) to be a primary focus.

There are additional opportunities for mulch to be used in niche markets such as erosion control and some perennial horticulture.

4. Strategic research and development objectives

Compost NZ will:

- Work with others to identify topics which are important to the organic recycling industry
- Commission studies in areas of particular importance
- Promote a multidisciplinary approach to organic recycling research
- Encourage implementation of relevant research findings and innovations
- Strengthen the system of research governance

- Develop portfolios of work in relevant topics
- Increase research capacity in under-developed fields
- Encourage increased co-operative working
- Encourage change in the allocation of science funding in a manner which benefits organic recycling research in New Zealand
- Maintain support for high quality projects proposed by individual researchers and groups.

5. Key Partners and Stakeholders

Key partners working with Compost NZ to achieve this strategy's goals are:

- Compost companies
- Local authorities
- Massey University
- University of Canterbury
- Zero Waste Academy
- Crown Research Institutes (ESR, Landcare Research)

Advice will be sought from:
Foundation for Research Science and Technology

The assistance of supply and service industries to the organic recycling industry will also be sought.

5.1 Partnerships

Increasingly, research funding requires the forging of private-public sector partnerships. The Research and development advisory group within Compost NZ will endeavour to facilitate these partnerships

International collaboration will also be a key path forward for the organic recycling sector in New Zealand. Effective and ongoing consultation with international partners will be further enhanced and complementary research programmes encouraged.

Compost NZ will promote the development and use of alternative financial instruments and other incentives to encourage private investment in organic recycling research. Recent changes tax laws for environmental projects are an example of where Compost NZ can work to identify new funding for research.

Compost NZ will consider other areas where public-private partnerships might be effective. We will also plan and implement a systematic evaluation of partnerships about types of cooperation: what works best for what circumstances.

6. Future Programme

Research in the organic recycling field is limited. However, some initial work has been carried out. Projects developed over the next year have the potential to form the basis of a comprehensive and successful research programme.

For the future, Compost NZ notes the importance of:

- continuity of research programmes
- maintaining existing approaches;
- building on past successes; and
- expanding areas of high priority and potential.

6.1 Forum recommendations

The 2006 research and development forum identified a number of areas where we could increase the effectiveness of funded research.

Specific recommendations include:

- Bringing all research together under **a Centre of Excellence**
- Focusing on **key researchable problems**, and bring to bear whatever combination of disciplines are needed to tackle them
- Giving more support for **developing research capacity**
- Putting more energy into **getting research into use**
- **Positioning Compost NZ research in a broad international context** rather than as a stand-alone programme
- **Looking to international funding**
- Highlighting the role of **private sector research and development** and increasing the potential for **collaboration**

6.2 Priority Research Areas

Research needs to focus on two different areas. Firstly, evidence of the value of organic recycled product to end users. Secondly, on tools for processors to overcome capacity constraints. Priority research areas to meet these requirements are described below:

6.2.1 Highlighting grower value

Key research is required in the following areas to help market development in the industry:

- Purpose specific compost quality specifications
- Nutrient contribution from compost
- Crop response (consistent, reliable)
- Soil improvement value
- Water savings potential
- Reduced risk of crop failure

- Increased crop value (marketable quality/yield)
- Disease suppression potential
- Benefits over time (1 – 5 years)
- Field trials to:
    - Determine mechanisms to optimise integration into farm management practices
    - Validate and refine specifications

A protocol covering the following will be necessary for field trials:

- Grower selection criteria
- Composter/grower collaboration
- Research field trials
- Demonstration trials
- Grower advisor participation in trials

6.2.2 Reducing processor capability constraints

Research will be required in the following areas to maximise opportunities for processors to improve operational efficiencies and minimise economic costs of production:

- Industry capacity to produce consistent product quality
- Cost effective spreader application technology and service providers
- Visible contamination issues

6.3 Other research needs

A series of other research requirements have been identified. These include:

- Identifying and prioritising markets (high value markets)
- Undertaking detailed needs analysis: technical (agricultural) and market research
- Research to underpin the development and documentation of performance based product specifications and application guidelines
- Research to support development of industry capacity
- Development of pathways to market and marketing tools
- Evaluation and continuous improvement tools

7. Research governance

At the first forum participants noted the usefulness of having an annual forum to ensure communication channels between researchers and industry remained open.

Compost NZ has established an sub committee to advise on research and development needs for the organics recycling industry. This committee will obtain advice and support from research organisations and Crown Research Institutes in ensuring research programmes are developed.

A national co-ordinator position will be established by Compost NZ with assistance form central and local government. The purpose of the position will be to work with New Zealand research bodies and international organic recycling organisations to ensure research needs of industry in New Zealand are met.

8. Research capacity

Building capacity requires substantive and long-term investment. The national co-ordinator will begin the process of working with funding agencies in New Zealand to build capacity within New Zealand. Key areas will be in marketing and social needs analysis research capability. A significant mismatch between researcher ability and industry need has been identified in these areas.

9. Getting research to users

Eight practitioner and end user workshops are planned for 2007. The success or otherwise of these initiatives will guide further work in this area.

10 Long term directions

This strategy has so far set out a framework for Compost NZ immediate actions over the period 2006/2007. In the longer term, there are four areas in which we need to make progress, if we are to have an impact in the marketplace and have access to adequate research funding to drive development in the sector.

(1) Focusing on the right research priorities

An annual forum between industry, researchers and research funding organisations will be held to ensure research priorities are agreed – both for short term and long term programmes.

(2) Contributing to better coordination among research financiers

Regular meetings will be held with senior management and Ministers to encourage collaboration and co-ordinate research requirements for the sector.

(3) Strengthening links with the private sector

Actively provide opportunities for end users and industry processors to meet and share knowledge about product requirements and research gains

(4) Monitoring and evaluation

To be effective, research requires rigorous quality control. Monitoring and evaluation will be central to our programme management.

There will be regular monitoring, to review research progress against both milestones and the underlying criteria for research, in order to 'sunset' research streams that have run their course.

Monitoring will also address the issue of ensuring adequate baseline data against which programmes can be monitored and evaluated.

We will use independent peer reviewers to select research projects and evaluate our programmes. The criteria will include likely effectiveness as well as rigour and commercial application.

We will include industry participants and as well as other researchers to avoid over-academic formulation of research requirements and results.

The research and development advisory committee will have important roles in overseeing quality control and providing advice.

Appendices

Appendix One
Consultation process

To promote progress with R+D in the organic recycling sector Compost NZ set up an advisory body with representatives from industry, university research bodies and the Compost NZ steering committee .

To aid the development of the strategy Compost NZ held a stakeholder forum on 3rd October 2006.

The aim of the Stakeholder Forum was to give representatives from a wider range of interested parties the chance to influence the Strategy. By means of breakout groups at the event, attendees were encouraged to comment on the draft themes and programme areas that had been developed by Compost NZ with assistance from the advisory group. Feedback from the forum has been used to inform the advisory group's subsequent meetings and the draft version of the strategy.

A separate report presents the main stakeholder feedback points on the developing research strategy theme areas which were received during, and following, the Stakeholder Forum.

Compost NZ R&D Roadmap

Stage 1	Stage 2	Stage 3
Product Development	▪ Identify priorities	Market Development
▪ Product gaps	▪ Investment portfolio	▪ Customer needs analysis
▪ Needs analysis	▪ Tools for delivering outcomes	▪ Brand profile/Communication
▪ Concept development		▪ Demand generation
▪ Pilot programs