

Organics into Agriculture

A project to examine the potential for the diversion of organic waste away from landfill and into use as an input to agricultural production in a regional setting.

Collaborative project participants:

EcoRecycle Victoria
The University of Melbourne
Calder Regional Waste Management Group
Desert Fringe Regional Waste Management Group
Grampians Regional Waste Management Group
Horsham Rural City Council
Vicgrain Limited
Victorian Farmers Federation

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Contents

Section 1. Executive Summary

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Background	1.1
Conclusions	
➤ Technical viability	1.3
➤ Financial viability	1.4
➤ Agronomic benefits	1.5
➤ Priorities	1.6
Future Challenges	1.7
Acknowledgements	1.8
A Final Word	1.9

Section 2. Economics & Options

Dr Rob Norton, Longerenong College, University of Melbourne.

Summary & Conclusions	2.3
Introduction	2.4
Evaluation report – terms of reference	2.6
Evaluation of regional composting facility	
➤ Scale of operation	2.7
➤ Market opportunities for composts	2.10
➤ Establishing a composting facility	2.12
➤ Managing the composting process	2.16
➤ Estimated operating, capital costs & returns	2.19
Alternative strategies for dealing with green waste	2.24
Areas for further investigation	2.25
References	2.27
Appendices	
➤ Appendix #1 - Cost of producing compost in the trial.	2.29
➤ Appendix #2 - Estimated cost of producing compost in the facility	2.31
➤ Appendix #3 - Suggested site plan for regional composting facility.	2.33

Section 3. Field Evaluation of Composted Green Organics

Dr Rob Norton, Longerenong College, University of Melbourne.

Summary	3.3
Introduction	3.4
Materials & Methods	3.7
Seasonal Conditions	3.10
Results & Discussion	3.11
Conclusions	3.17
Acknowledgements	3.17
References	3.18
Appendix #1 - Soil test results	3.19

Section 4. Sources of Organic Wastes

Mr Chris Hood, Wimmera Worms & Casts.

Summary	
➤ Aims	4.3
➤ Scope of the Audit	4.3
➤ Measurement of Quantities	4.3
➤ Current Waste Disposal Methods	4.5
➤ Contaminants	4.7
➤ Costs/Revenues	4.7
➤ Marketing	4.8
Introduction	
➤ Project Goals	4.9
➤ Scope of the Audit	4.9
Method	
➤ Development of the Survey	4.10
➤ Identification of respondents	4.10
➤ Distribution of Survey	4.11
➤ Data Presentation	4.11
➤ Determining Quantities	4.11
The Audit	
➤ Green Waste by Municipality	4.12
➤ Sludge	4.19
➤ Manure	4.20
➤ Grain Waste	4.21
➤ Feathers	4.21
➤ Vineyard Waste	4.22
➤ Abattoir Waste	4.23

Sources of Organic Wastes (Continued)

➤ Timber Waste	4.23
➤ Supermarket Waste	4.23
References	4.24
Appendices	
➤ Appendix #1 - The survey by municipality	4.25
➤ Wastes available for composting	4.30
➤ Contact details of companies/authorities surveyed with waste	4.32

Section 5. Vermicast Production

Mr Chris Hood, Wimmera Worms & Casts

Summary	5.3
Introduction	5.4
The use of worms to deal with Organic Wastes	5.4
Materials Used	5.6
Mixtures Developed	5.7
Processing	5.8
Results	5.10
Costs	5.12
Conclusion	5.13
References	5.13

Section 6. Composting Processes & Procedures

Mr David Basil, Pinegro Products Pty Ltd.

Summary	6.3
Introduction	6.4
Composting Fundamentals	
➤ Benefits of Composting	
• Eliminate Toxic Effects	6.4
• Stabilise Organic Substrates	6.4
• Reduce Pathogen Risks To Plants	6.5
➤ The Composting Process	6.5

Composting Processes & Procedures (Continued)

Composting Project	
➤ Composting Aims	6.7
➤ Materials & Methods	
• Importing Technologies & Skills	6.7
• Windrow Composting	6.8
• Sampling & Testing	6.8
• Process Control	6.9
➤ Results	
• Composting Temperatures	6.11
• Ph	6.14
• Total Nitrogen and Carbon Fluctuations	6.16
• Mineral Nitrogen Fluctuations	6.17
Operating Procedures	
➤ Receival & Contaminants Check	6.21
➤ Raw Materials Preparation	6.21
➤ Building a Windrow	6.22
➤ Aerating Compost Windrows	6.22
➤ Watering Windrows	6.23
➤ Temperature Monitoring Procedure	6.24
➤ Sampling	6.25
Appendices	
➤ Appendix #1 - Test Results	6.26
➤ Appendix #2 - Occupational Health & Safety	6.33
➤ Appendix #3 - Materials Safety Data Sheet	6.38
➤ Appendix #4 – Blank Forms	6.43

Organics into Agriculture

Executive Summary

1.1 Background

State Government waste management policy requires a 50% reduction in the volume of waste going to landfill. To meet this objective a general strategy of “reduce, reuse or recycle” is being pursued, with significant support from EcoRecycle Victoria.

Organic wastes, particularly green organics, are a major component of the waste stream that can be readily diverted away from landfill and make a positive contribution to meeting the policy objective of reducing the volume of materials going to landfill. Green waste and other organic materials typically comprise 20% to 30%, by weight, of the waste stream in rural areas.

Many rural councils have been very successful in diverting organic materials away from landfill. However, the re-use of this material has particular problems attaching to it. Experience from some rural councils suggests that the current process of diversion from landfill, chipping or grinding and subsequently storing in untreated stockpiles is unlikely to be sustainable.

Two major impediments exist to the expansion of the use of this material in a raw chipped or ground mulch form.

Firstly, the lack of quality control over the product and, often, the presence of significant quantities of extraneous contaminants such as plastic and metal, and;

Secondly, a major concern arising from issues of liability flowing from

the use of material that may have significant seed loads and pathogens present in it. Providers of liability insurance to local Government are expressing concern regarding the continued sale of untreated material without appropriate quality control measures to minimise risks associated with the use of the product.

Burning of raw material in many instances, particularly in centres where population exceeds 5,000 persons, is not an option under Environment Protection Authority Regulations. Community expectations also have moved towards a point of viewing burning as an unacceptable means of disposal of this material in many instances.

It has also been recognised that even after composting, to remove seed pathogens and disease risks, local domestic markets, particularly for use in home gardens lack the capacity to absorb the quantity of material that is being diverted from landfill. The inherent low value of the material precludes transportation to larger urban centres where greater market potential may exist.

Industry groups across regional Victoria also have emerging requirements to develop alternative responsible avenues for disposal of waste from the grain, poultry and piggery and other food processing industries.

It was against this backdrop that the project was implemented specifically to determine:

- The potential that exists to divert organic materials, after appropriate processing, into use as an input to agricultural production.
- The potential to transfer appropriate skills and technologies to rural regions to convert organic wastes to a form suitable for re-use in agricultural production.
- The benefits that the use of processed organic materials may have for agriculture, particularly broad acre cropping.

- The particular barriers that may exist to the diversion of organic materials away from landfill for use as an input to agriculture.
- The range, and suitability of, various waste organic materials within the participating regions for use in agriculture after conversion by composting or vermiculture processes.
- The appropriateness and suitability of Best Practice Guidelines in Composting and Vermiculture in the specific circumstances of the participating regions.
- The ability to produce a compost product that conforms with the requirements of AS4454.

1.2 Conclusions

Fundamental conclusions that have been reached from the project relating to the key issues of Technical Viability, Financial Viability, Agronomic Benefits and Future Priorities can be summarised as follows:

1.2.1 Technical Viability

Compost production was successfully carried out for the project at a site provided by the Horsham Rural City Council at Horsham. This site was approximately 1 hectare in area; generally flat with an all-weather trafficable surface and a mains water supply with limited capacity. However, notwithstanding the limited infrastructure available on the site no significant problems, other than lack of adequate water volumes, were experienced that impacted on the production of compost.

Experience gained indicated:

- Compost, which meets the requirements of Australian Standard AS4454, can be produced within rural regions with relatively low capital costs in an open windrow system.
- Implementation of processes for the production of compost in accordance with “*Guide to Best Practice – Composting Green Organics*” is achievable in a cost effective manner in a rural environment.

- Sufficient capacity exists in rural regions to readily develop the necessary skills to operate a composting facility. Modest training of personnel is required to oversee the process with required skills focusing on material handling, monitoring of temperature and moisture levels, sampling procedures, maintenance of batch records and occupational health and safety.
- Composting is the preferred conversion process. Vermiculture performance suffers in cold or hot weather due to difficulties maintaining an appropriate microclimate for optimum worm activity. Acceptable vermiculture results are unlikely to be achieved without the use of in-vessel or other enclosed environment solutions, which are inherently capital intensive and unlikely to be economically viable in a rural environment.
- Sufficient green waste, supplemented by various other organic wastes, exist within the participating regions, which, if diverted away from landfill into use in agriculture after appropriate processing, would make a significant contribution to meeting Policy requirements for a reduction in the volume of materials going to landfill.
- Composted material can be handled and applied with conventional farming equipment in a broad acre environment. Specialist spreading equipment is likely to be required for application of the material in vineyards.

1.2.2 Financial Viability:

- Contamination of raw material, particularly green waste, is a fundamental problem that impacts on the quality, and hence value, of material produced. Additional efforts are required to ensure the quality, particularly lack of contaminants, of raw organic material with effort focused at the point of disposal.

- Broad acre application of composted material is feasible but unlikely to be economically viable, as the value of compost has been determined to be approximately \$4 to \$5 per tonne in the paddock in terms of its fertiliser value. Longer-term benefits to soil structure could not be quantified within the constraints of the project.
- Use in viticulture as a mulch for moisture retention appears to have potential as an economically viable means of disposal of processed material with indications existing that the grape industry is willing to pay in the order of \$15 per tonne for compost ex. production site.
- Economies of scale are a major factor in the development of a regional system to handle organic waste in a rural setting. It is likely that it will be more cost effective to transport raw mulch material to one site rather than have compost production sites processing dispersed within a region.
- Some specialist equipment is likely to be necessary within rural regions for the operation of a composting facility. Equipment for screening of material is unlikely to be available on a hire basis at a rate that would allow material to be processed in a cost-efficient manner.
- Any consideration of the financial viability of diversion of organic material from landfill via composting for reuse in agriculture should consider the avoided cost of landfill in the analysis.

1.2.3 Agronomic Benefits.

A fundamental goal of the project was to determine the potential benefits to broad acre cropping of application of composted material.

Comprehensive replicated field trials were carried out by Dr Rob Norton, University of Melbourne, which enabled the following conclusions to be drawn:

- Applications of approximately fifteen tonnes per hectare of

compost produced a yield response in the year of application similar to the response of between 30 kg/ha and 60kg/ha of nitrogen or 50 kg to 110 kg of urea per hectare. This response was approximately 20% above the typical 4 t/ha untreated yield.

- Based on the data from a single site and year, the agronomic value of composted green waste is estimated to be between \$4 and \$5 per tonne, on farm.
- Composts that included a larger component of piggery litter or grain waste with green waste showed better growth responses than compost that was produced using only a small amount of high N supplement with green waste.
- The true agronomic value of composted materials is unlikely to be measured in a single crop year. Benefits in subsequent years may accrue due to additional N (nitrogen) mineralisation and soil structure benefits.
- The only site to show clear benefit from the application of vermicast was at Telopea Downs, a site predominantly comprised of non-wetting sands.

1.2.4 Priorities:

Whilst the project has brought clarity to a number of technical issues, other matters have been brought into focus as requiring further efforts, particularly from a regional waste management perspective, to enable the latent potential of waste organics processing to be realised in a rural environment. Further immediate efforts are required to:

- Determine the most cost effective approach to the provision of facilities in any particular area, particularly the trade off of minimisation of transport costs by dispersal of facilities against gains of economies of scale by consolidation of facilities in more focused locations.
- Develop partnerships with potential users of the product, particularly in developing specifications for products for particular applications.

- Develop partnerships with operators of composting facilities, particularly in relation to the marketing of compost material, perhaps involving risk sharing until a more mature and stable market environment for the product is achieved.
- Secure financial support from EcoRecycle Victoria and other major stakeholders that is specifically directed at removing major impediments to the development of an appropriate production and market environment. Particular needs have been identified for equipment for screening material and spreading compost in vineyard applications, the provision of which is unlikely to be achievable without external financial support.

1.3 Future Challenges

The project has achieved significant progress in facilitating the development of an understanding by all stakeholders in the waste management arena of the potential that exists for alternative treatment of green and other organic wastes. Awareness is emerging that this material is in fact a resource to be harvested and put to economic use rather than simply a waste product to be disposed of by the most economic method, regardless of the use of finite resources, such as landfill capacity, and wider environmental costs.

However, future challenges are not to be underestimated and include:

- The need to maintain the momentum that the project has created in the participating regions in fostering interest in the use of waste organic materials as a resource for use in agriculture.
- The need to remove obstacles to the flow of material to the market place; for example, the need to have access to cost effective screening facilities and specialist spreading equipment.
- The need to secure a real commitment from local government to implement the changes necessary to develop regional facilities to divert, process and market the material.

1.4 Acknowledgements

The project could not have been implemented without the shared vision of the Calder, Desert Fringe and Grampians Regional Waste Management Groups. EcoRecycle Victoria provided significant funding to support the project, as did the participating Regional Waste Management Groups and Vicgrain. The Horsham Rural City Council, who provided a site and associated infrastructure and equipment for the conversion of materials, also made a major contribution to the project.

The commitment and professionalism of Dr Rob Norton (Melbourne University) who managed the major agronomy and economic evaluation components of the project was particularly appreciated. Mr Chris Hood (Wimmera Worm Casts), who oversaw the production of compost and vermicast as well as undertaking the inventory of organic wastes across the participating regions and Mr David Basil (Pinegro Pty Ltd), who provided the technical assistance required for the compost production, both made major contributions to the progress of the project.

Dr Trish McGee of EcoRecycle and Ms Susannah Tymms of the Institute of Horticultural Development also provided valuable moral support and technical assistance.

Enthusiasm and ongoing effort to promote the interests of the project were willingly given by Mr Ted Woodhart, President, and Mr Sid Cramer, Field Officer, of the Horsham Branch of the Victorian Farmers Federation.

Particular thanks is also due to the farmers who participated in and facilitated the field trials, M. Carter of Marong, T Price of Vectis, R Mackley of Grass Flat, G Eagle of Laharum and R Rethus of Telopea Downs.

Last but not least, a special acknowledgement for the support and encouragement of Mr David Eltringham of the Horsham Rural City Council for his and his Council's efforts to support and assist the project, particularly in delivering solutions to problems of water supply to the production site and transport, handling and screening of materials.

1.5 A Final Word

In compiling this summary an effort has been made to capture the essence of issues, conclusions and lessons provided by the project.

The diversion of organic waste from landfill is a multi-faceted and problematic task involving development of specialist technical skills, logistical complexities, marketing challenges and competition for scarce financial resources. Stakeholders are encouraged to invest the time in reviewing the enclosed technical material in detail.

The following reports provide an extremely valuable resource for anyone considering issues associated with the disposal of organic wastes in a rural environment. Depending on the reviewers particular perspective, priorities and operating environment significantly different conclusions may be reached to those expressed by this writer.

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