

Research priorities in the field of land application

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BACKGROUND

The New Zealand Land Treatment Collective (the 'NZLTC') was established to: (i) provide a forum for networking related to the treatment of wastes and waste products by land application and (ii) to support the extension of research in this area, providing its members with the most recent information on land treatment technology, research and information.

In order for the ongoing functioning of the Collective, it was decided that new research projects should be identified and initiated. So, the Collective's Technical Committee embarked on a stock-take process, as described by Horswell and Lowe (2007), with the following objectives:

- (1) Identify research capabilities in the treatment of wastes and waste products by land application;
- (2) Identify research gaps;
- (3) Avoid duplication;
- (4) Establish key R&D needs of the industry; and
- (5) Identify funding bodies.

A series of meetings and workshops was held with researchers and members to identify current research projects, information gaps, new technologies, research required to support new technologies, current capabilities and possibly opportunities.

From this, a list of potential projects was published in the NZLTC newsletter Issue 22, Autumn 2007 and comments invited. The list of potential projects was then presented to end users at the Annual Conference in Rotorua (Horswell and Lowe, 2007), where they were prioritised by participants. This document presents the outcome of this process – the priority research areas, topics and projects.

RESEARCH PRIORITIES

The identified potential research areas, topics and potential projects were rated by participants at the Annual Conference in Rotorua, March 2007 and are presented in Table 1.

Table 1. Summary of potential research areas, topics and potential projects with the highest scoring identified (*).

Area	Topic	Potential Project
Pathogens	<i>*Fate/transport and survival in environment</i>	*Environmental fate of biosolids and effluent-borne pathogens (with a particular focus on bacteria and viruses), including transport and survival in aerosols, soils, vadose zone and groundwater. Treatment systems - The fate of pathogens in sewage treatment systems.
*Nutrients	<i>*Monitoring/Standards/Policy</i>	*Source control of nutrients i.e. washing powder etc. identify reductions that this can achieve.
	<i>Impact on Soil Properties</i>	How do soil properties change with constituents in applied material?
	<i>*Reuse/ Minimisation Potential</i>	*What scope is there to stop/reduce/minimise contaminants reaching the LT area.
	<i>*Biofuels</i>	What scope is there for generating sustainable energy crops to reduce dependency on finite resources.
	<i>Management to Achieve Research Targets</i>	What management and design is required to minimise nutrient losses in field settings.
*Effluents	<i>Other Contaminants</i>	*Effect of emerging contaminants such as endocrine inhibitors and pharmaceuticals on the environment
	<i>Airborne Health Risk</i>	What are the potential health risks from airborne contaminants. This is not only pathogens. What are the more suitable forms of application and mitigation options to minimise risks.
	<i>Consistency of Rules</i>	How can lack of consistency within and between councils with respect to assessing the impact of land application be addressed?
	<i>Management</i>	Can operational systems reach research potential and how is operational management refined to get the most out of a system?
*On-site	<i>*Irrigation Performance and Design</i>	Refinement of drip irrigation design.
	<i>*Education, Management and Servicing</i>	*How are home owners educated and maintenance contracts administered? *How will on-site systems be managed in long term?
	<i>*Maintenance and Monitoring Requirements</i>	What are the basic/bottom line management and maintenance requirements?
	<i>What Technology is Available</i>	Which treatment systems are suited to what setting and how will they perform in the longer term?
	<i>On-site, Cluster, Communal Transition</i>	At what stage is there the need to recommend reticulation to a central plant? Is this dependent on effluent quality, density, receiving environment and/or management?
	<i>Quantification of Discharge System Performance</i>	What are the actual effects of various discharge systems under varying effluent quality?
Biosolids	<i>Marketing/ Market Research</i>	Identifying and understanding barriers to biosolids re-use including (could include various guidelines and standards such as MfE): exploring potential demand by product category (Class A or Class B) and researching and assessing the competitive situation (e.g. alternative fertilisers).

	<i>Contaminants/Environmental impacts</i>	Environmental fate and effects of organic (pharmaceuticals) and inorganic (heavy metals) contaminants from biosolids (sewage sludge) “beneficially” applied to land.
	<i>Beneficial use</i>	Exploring the potential of beneficial microbes in biosolids (natural and inoculated) on soil health and crop yields including role in reducing plant disease.
Social Policy	<i>Education/ social acceptance</i>	Identifying and understanding social barriers to effluent and biosolids re-use.
Hydraulic Loading	<i>Application Rates</i>	Matching application rates to soil properties in relation to soil types, slopes and land use to minimise leaching and runoff.
	<i>Monitoring Suitability of Rates</i>	Design application rates are often based on soil properties, climate, receiving environment and type of waste. While design would support minimal effects, especially leaching, the actual effects are not well monitored.
	<i>Impact of Long Term Applications</i>	How do soil properties change over time and what is their impact on the hydraulic loading and resulting environmental effects?
	<i>Nutrient vs Hydraulic Relationship</i>	How does changing application rate influence leaching of nutrients?
	<i>Availability of Models/Tools</i>	Design of predictive ‘tools’ to determine a suitable application rate and the impact on groundwater.
General	<i>Models/Tools</i>	Development of models and tools to design systems and simulate the fate of contaminants?
	<i>Overlap of Systems and Technology</i>	There appears to be a big overlaps between questions being asked in different areas. Can we collate information and stop reinventing the wheel?

WHERE TOO FROM HERE?

In partnership with LTC members and Collaborators, we are now looking to develop a number of these prioritised research ideas. We are looking for:

- sites to undertake investigations;
- potential private sector funding; and
- Regional and District Councils who are prepared to support or host specific projects.

While the abilities of research organisations have already been canvassed, if there have been changes in expertise or if you see an opportunity to add value to an existing project, please contact either Jacqui Horswell (jacqui.horswell@esr.cri.nz), Hamish Lowe (Hamish.Lowe@duffillwatts.com) or Alison Lowe (Alison.Lowe@rdc.govt.nz).

REFERENCES

J. Horswell and H. Lowe. 2007. Overview of current research projects in the field of land application. Pp116-118 *In: LTC 2007 Annual Conference Proceedings.*