Research Round Up

Title of the project:

1. Biocides in biosolids
2. Wastewater contaminant loading to New Zealand's aquatic environment
3. Effect of sample matrix on the performance of estrogenic bioassays
4. Quantifying steroid hormones in NZ waste water treatment plant effluents

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Funding Body: ESR (subcontracted through FRST funding); HortResearch (internal investment)

Collaborating organisations:
Landcare Research (Louis Tremblay); Environmental Science and Research (Jacqui Horswell and Tom Speir), University of Technology Sydney (Richard Lim); Waikato University (Alistair Wilkins, and Marilyn Manly-Harris),

Key issue/s addressed:
Do organic biocides present in biosolids affect soil microbial activity?
Are emerging wastewater contaminants accumulating in New Zealands aquatic environments and affecting aquatic organisms?
How reliable are measures of estrogenic activity obtained by bioassay?
Do steroid hormones in NZ WWTP effluent present a risk to aquatic organisms?

Objectives:

1. establish concentration of organic biocides in NZ biosolids; assess and compare the synergistic effects of metal and organic biocides on the microbial function of NZ soils
2. measure the concentration of emerging organic wastewater contaminants in WWTP effluents released to aquatic environments; do these contaminants persist?; do they accumulate in aquatic food chains?
3. assess the effect of residual sample matrix on the performance of bioassays measuring estrogenic activity of challenging effluents
4. measure the levels of steroid hormone residues in WWTP effluents released to aquatic waterways

Planned Outputs/Outcome (by when):

1. Results will be published. Provide risk assessment and recommendations for biosolids applied to land in NZ; provide core advice to Biosolids Industry in NZ and Ministry for the Environment. 2 years remaining in existing funded program.
2. Publish results; provide a risk assessment for emerging organic compounds in aquatic environments, use results to develop environmental monitoring tools/approaches for Regional Authorities. PhD project
3. Publish results, determine relative advantages/disadvantages of bioassy formats, recommendations for use of bioassays to assess estrogenic activity of difficult effluent matrices. 2008.
4. Publish results of general survey, develop risk assessment of steroid residues in receiving systems

Methodological approach:

1. Biocides and biosolids applied to soil lysimeters, residues and microbial parameters being assessed
2. WWTP effluent survey and analysis, seasonal field sampling and analysis of sediment and resident biota
3. Sample extraction, matrix dilution and analysis by GCMS and three bioassays
4. method development and validation, sample extraction and analysis by GCMS

Key findings so far:

1. Too early to determine
2. Beginning October
3. Cytotoxicity of extracts to test cells is a problem
4. derivitisation procedure is critical for sensitivity, some steroids produce more than one derivative, coelution of androgens presents challenges