

Project Description

Title	Toxin risks in recycled water used for Irrigation
Project Type	<input type="checkbox"/> State-of-knowledge <input type="checkbox"/> Problem Definition <input checked="" type="checkbox"/> Knowledge Generation <input type="checkbox"/> Knowledge Transfer <input type="checkbox"/> Knowledge Adoption <input type="checkbox"/> Benefit Realisation
Problem	<p>Effluent from wastewater treatment is often stored for periods of time in open lagoons that promote growth of cyanobacteria and potentially toxin production. Cyanobacteria and toxins may be present in the recycled water used for irrigation and can persist for extended periods, up to 6 months during warmer weather. During this period high levels of toxin can occur and the risks associated with use of this water need to be managed.</p> <p>Recent work has demonstrated the uptake of toxin and bioaccumulation into some food crops. There are a number of factors influencing the potential for uptake including bioavailability of the toxin and the crop type. It is not clear whether toxin uptake applies to all food crops commonly irrigated. Further, most experimental studies have used short term irrigation periods and toxin levels that are not as high as reported in recycled water lagoons.</p> <p>It is important to understand the risk to agriculture through repeated irrigation of crops with recycled water containing toxin to inform the human health risk assessment. However, the risk to agricultural or recreational end users are not well understood. For example, what are the risks to consumers of food grown with recycled water and can the toxin be detected in foods and does it bioaccumulate. Also is there any risk to stock feed on crops and pasture irrigated with recycled water or to humans that come in contact with irrigated crops.</p>
Background/Description:	Effluent from wastewater treatment is a valuable source of water that the water industry is increasingly turning to as alternative fresh water supplies and potable water. Typically, there is a need to store the effluent due to varying need of end users. Storage is often in open lagoons that promote growth of cyanobacteria and potentially toxin production.
Objectives:	Understand the risks to end users of recycled water used for irrigation.
Scope/Deliverables:	1. Review the literature on risks to end users from toxins in recycled water used for agricultural/horticulture crops and their introduction into the human food chain. e.g. fruit and

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	<p>vegetables, cereal crops, pasture. What is currently understood and what further information is required. Specific areas for consideration include:</p> <ul style="list-style-type: none"> • Spray irrigation vs drip irrigation . • Exposure through consumption • Experiences of both Australian and overseas wastewater authorities. • What guidelines/standards currently exist in Australia or overseas. <p>2. Design experiments to investigate the risks. Options include:</p> <ul style="list-style-type: none"> • Sampling of crops already being irrigated with recycled water to determine toxin uptake. • Sampling of soils for toxin at different depths over an irrigation season. • Determining whether soils seasonally exposed to toxin are capable of biodegradation • Breakdown of toxins following spray or surface irrigation(drip) e.g. in soil or exposed to sunlight • Hydroponic experiments investigating mechanism of toxin uptake and bioaccumulation. <p>3. Determine if there is evidence for the establishment of limits and guidelines for the use of recycled water for irrigation</p> <p>4. Report on literature review and investigations</p>
Benefits	<ol style="list-style-type: none"> 1. Provide information for the health regulator and utilities to better manage the risks associated with irrigation of food crops with recycled water containing toxins 2. Provide and understanding of conditions/toxin levels that would warrant cease to irrigate 3. Provide information to utility to understand/pre-empt operational response 4. Understand the toxin risks to end users of recycled water 5. Provide guidance to end users on how to control toxin risks 6. Provide guidance to operators of recycled water schemes 7. Determine applicability of guidelines/standards
Research approach	<p>Research approach to be used: Tailored collaboration or Open Tender</p>
Funding required:	<p><input type="checkbox"/>Small (<\$100k) <input checked="" type="checkbox"/>Medium (\$100-\$500k) <input type="checkbox"/>Large (>\$500k)</p>
Duration/Start	<p><input type="checkbox"/>Short (<6 months) <input checked="" type="checkbox"/>Medium (6-18 months) <input type="checkbox"/>Long (>18 months) Start: ?</p>