

ENVIRONMENTAL HEALTH FACT SHEET

No. 512

STANDARDS FOR MICROBIOLOGICAL QUALITY OF RECYCLED WATER FOR IRRIGATING FOOD CROPS

This fact sheet details the standards for the microbiological quality of recycled water supplied for irrigating food crops. These standards provide clarification to the 'potential end uses' detailed in Tables 5 & 6 of the DHF *Guidelines for Management of Recycled Water Systems*. These standards are only permitted to be used for DHF approved recycled water systems.

These standards are based on Queensland Regulations/Standards for recycled water and also the *Australian Guidelines for Water Recycling: Managing Health and Environmental Health Risks (Phase 1)*, in particular Table 3.8.

Although the NT does not use a 'Class' system for microbiological classification of recycled water, as a guide the following comparison can be made to Queensland Standards of recycled water:

Class A+ <1 cfu/100 mL

Class C <1000 cfu/100 mL

Class B <100 cfu/100 mL

Class D <10 000 cfu/100 mL

Type of Commercial Food Crop	Method of Irrigation & On-site preventative measures	<i>E.coli</i>
Crops consumed raw or unprocessed e.g. carrots, broccoli, onions, cabbage Includes rockmelons	Spray, drip, flood, furrow or subsurface No preventative measures required although pathogen reduction will happen between harvesting and sale	<1 cfu/100 mL
Crops for produce grown in hydroponic conditions e.g. herbs, lettuce	Hydroponic	<1 cfu/100 mL*
Crops with limited or no ground contact and eaten raw e.g. tomatoes, capsicums	Drip irrigation No harvest of wet or dropped produce	<100 cfu/100 mL
	Subsurface No harvest of wet or dropped produce	<1000 cfu/100 mL*
Crops with ground contact with skins removed (other than rock melons) before consumption e.g. watermelons	Spray, drip, flood, furrow or subsurface If spray irrigation, minimum 2 days between final irrigation and harvest Pathogen reduction between harvesting and sale	<100 cfu/100 mL

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Type of Commercial Food Crop	Method of Irrigation & On-site preventative measures	<i>E.coli</i>
Crops with no ground contact with skin removed before consumption e.g. citrus, nuts, avocado, banana, mango	Spray Minimum 2 days between final irrigation and harvest No harvest of wet or dropped produce Pathogen reduction between harvesting and sale	<100 cfu/100 mL
	Drip, flood, furrow or subsurface No harvest of wet or dropped produce Pathogen reduction between harvesting and sale	<1000 cfu/100 mL*
Crops with no ground contact and heavily processed e.g. grapes for wine production, cereals	Drip, flood, furrow or subsurface No harvest of wet or dropped produce Pathogen reduction between harvesting and sale	<1000 cfu/100mL
Crops cooked/processed before consumption e.g. potatoes, beetroot	Drip, flood, furrow or subsurface No harvest of wet or dropped produce Pathogen reduction between harvesting and sale	<1000 cfu/100mL
Raised crops e.g. apples, apricots, grapes, olive, peach	Drip, flood or furrow No harvest of wet or dropped produce Pathogen reduction between harvesting and sale	<100 cfu/100 mL*
	Subsurface No harvest of wet or dropped produce Pathogen reduction between harvesting and sale	<1000 cfu/100 mL

ON-SITE PREVENTATIVE MEASURES FOR PUBLIC IN VICINITY OF FOOD CROP IRRIGATION AREAS

E.coli	On-site Preventative Measure
<100 cfu/100 mL	No access and drip or subsurface irrigation No access during irrigation and if spray irrigation, minimum 25-30 m buffer distance between irrigation areas and nearest public access point
<1000 cfu/100 mL	No access and drip or subsurface irrigation No access during irrigation and if spray irrigation, minimum 25-30 m buffer distance between irrigation areas and nearest public access point, and spray drift control, e.g. through part circle sprinklers with 180o inward throw, vegetation screening or anemometer switching <i>or</i> Extended buffer distances to >50 m

IRRIGATING FOOD CROPS¹

Regardless of the standard of recycled water used, irrigation of food crops using recycled water should only take place if the proponent or end user has demonstrated that a HACCP or equivalent food industry risk assessment has been applied to the growing of the crops. HACCP assessments for irrigation of food crops must also take account of risks associated with post-harvest handling. For example, while an irrigated vegetable crop may have post-harvest processing or cooking, or a thick removable rind, irrigation with lower classes of recycled water could expose other harvested crops to cross-contamination risks during post-harvest handling (particularly during washing of produce), especially if the other crops are consumed raw.

The risks associated with food crops irrigated with recycled water vary with quality of the recycled water used, the irrigation delivery system, the type of crop, the nature of post-harvest handling and the extent of post-harvest processing.

Food sold in the Northern Territory must comply with the requirements of the NT *Food Act* 2004, and the Australia New Zealand Food Standards Code. In particular, Standard 1.4.2 of Part 1.4 (Contaminants and Residues) of the code sets out maximum residue limits (MRLs) for a wide range of contaminants that can enter the food chain during food production. If a chemical is detected in food that is above the MRL for that chemical, or is detected at any level for a chemical for which there is no MRL, then that food would be considered 'unsuitable' under the NT *Food Act* 2004.

This has clear implications for the recycled water producer's trade waste management. If it is identified that there are potentially hazardous chemicals in the source raw sewage, there may be a need for specific monitoring to ensure that treatment processes are consistently removing these contaminants.

¹ Based on QLD Water Recycling Guidelines

Although uptake of chemical contaminants by food crops is not well understood, contaminant levels in food are unlikely to be affected by the generally low levels of chemical residues typically found in those classes of recycled water that are suitable for irrigation of food crops.

Any food crops that are likely to be consumed raw should only be irrigated with *E. coli* <1 cfu/100 mL (Class A+) recycled water. Crops that receive intensive, obligatory post-harvest processing, such as sugarcane or wine grapes, can be irrigated with *E. coli* <1000 cfu/1000 mL (Class C) recycled water. Above ground food crops with subsurface irrigation delivery systems can also use *E. coli* <1000 cfu/1000 mL (Class C) recycled water. Above ground food crops watered via spray irrigation and all root crops should use *E. coli* <1 cfu/1000 mL (Class A+) recycled water but if approved risk management strategies are adopted that can guarantee the safety of the crop being irrigated, an alternative class of recycled water could be used.

The Commonwealth Department of Agriculture, Fisheries and Forestry has produced *Guidelines for On-farm Food Safety for Fresh Produce* (AFFA 2001) that provide a single consolidated source of information relating to on-farm food safety for fresh produce crops. They are designed to help assess the risks to food safety during on-farm production of fresh crops and provide information on good practices to prevent, reduce or eliminate the hazards, including the risk of contaminating produce when using water.

Many retail nurseries supply food plants that may be eaten shortly after sale (e.g. herbs and some vegetables). These should only be irrigated with *E. coli* <1 cfu/1000 mL (Class A+) recycled water. Retail nurseries may also have a very high level of contact between customers (or workers) and wetted surfaces including plants. Therefore *E. coli* <100 cfu/1000 mL (Class B) recycled water or preferably better should be used for irrigation in retail nurseries. If an approved risk management plan incorporating HACCP is prepared that can demonstrate that health risks can be managed, a lower class of recycled water could be used.

***Based on Part 7 of the Queensland Water Recycling Guidelines 2005*

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