

Disinfestation of water sources for nursery irrigation

Filtration provides the essential pre-treatment for almost all irrigation water disinfestation systems by either ensuring the required water quality for a particular system to operate successfully or by reducing the contaminants in the water and ultimately reducing the disinfestation costs.

Production nursery filtration should be designed and installed as an integral part of the overall irrigation system based on the water source, water quality, disinfestation requirements, and the selected sprinklers or drippers. A water sample can quickly identify contaminants in the water and an irrigation specialist can provide suggestions for the effective elimination of the problem.

Disinfestation treatment	Advantages (when used as recommended)	Disadvantages
<p><u>Chlorination</u> Most widely used treatment in Australia. Sodium or calcium hypochlorite can be used.</p>	<ul style="list-style-type: none"> • Effective disinfestation agent • Relatively safe and non phytotoxic • Can be measured effectively using a DPD pool chlorine test kit • Test kits are inexpensive • Chlorine products are relatively inexpensive • Chlorine is commercially available • Equipment costs are relatively inexpensive • Precipitates iron and manganese 	<ul style="list-style-type: none"> • Requires water pH to be monitored and adjusted (pH5 – pH7) • Chlorine is rapidly used up by impurities in the water • Requires regular weekly testing of residual chlorine levels • Requires storage tank to achieve contact time and residual (2.5ppm residual after a 30 minute contact time) • Corrosive and requires careful handling • Shelf life of chlorine products is limited to approximately 1 month • Unsuitable for water with high iron concentrations above 0.5ppm • Does not have efficacy against all plant pathogens or life stages
<p><u>Chlorine dioxide</u> Has been well tested and has a demonstrated effectiveness against a range of plant pathogens.</p>	<ul style="list-style-type: none"> • Potent oxidant • Effective in water with pH as high as 10 • Requires shorter contact time (concentration of 3ppm for 8 minutes is required for control of waterborne fungal pathogens) • Residual activity is longer than chlorine • Effective against a broad range of plant pathogens 	<ul style="list-style-type: none"> • Unstable gas that must be generated onsite • Equipment is relatively expensive • Requires accurate and regular testing of residual level • Does not have efficacy against all plant pathogens or life stages
<p><u>Chloro-bromination</u> Bromine is a member of the same family as chlorine and has similar action in disinfecting water.</p>	<ul style="list-style-type: none"> • Greater effective pH operating range than chlorine (up to pH9) • Relatively inexpensive • Setup costs are moderate • Testing residual levels weekly is relatively simple and inexpensive 	<ul style="list-style-type: none"> • Increased equipment costs when compared to chlorine • pH requires monitoring and may need adjusting • Requires storage tank to achieve contact time (3ppm for 8 minutes) • Does not have efficacy against all plant pathogens or life stages
<p><u>Ultraviolet light</u> UV dose and effectiveness are dependent on the</p>	<ul style="list-style-type: none"> • Non chemical, non toxic • No waste products • Environmentally friendly 	<ul style="list-style-type: none"> • Water quality is critical – high quality, free of tannins • Extremely high level of filtration required

clarity of the water.		<ul style="list-style-type: none"> • Difficult to monitor effectiveness • Must be designed to water flow rates and water quality • Maintenance is critical
<u>Slow sand filtration (SSF)</u> Antagonistic micro-organisms in the bio-filter attack and destroy plant pathogens.	<ul style="list-style-type: none"> • No chemicals required • Relatively low cost construction • Low cost operation • Virtually no waste products • Environmentally friendly 	<ul style="list-style-type: none"> • Flow rates should not exceed 300L/m²/hr • Large tanks required for high flow rates • Water level maintenance in SSF is critical to effectiveness • Maintenance is critical
<u>Ultra-filtration</u> This membrane filtration is used to filter pathogens from the water.	<ul style="list-style-type: none"> • Removes all plant pathogens including viruses • Cost effective at low flow rates • Can be automated • Environmentally friendly • No chemicals required (small quantity of Chlorine during backwash) 	<ul style="list-style-type: none"> • Expensive at high flow rates • Membrane replacement costs (maintenance costs) • Waste water from filter back flushing filter requires disposal

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