



Nursery & Garden Industry
Queensland

An Introduction to Filtration Systems in Production Nurseries

Filtration is vitally important in the operation of all sprinkler and dripper systems, reducing chemical sediment and slime build-up in pipes and fittings, and preventing any larger particles clogging the system. Filtration provides the essential pre-treatment for almost all irrigation water disinfection systems, by either ensuring the water quality required is provided, or by reducing the contaminants in the water and reducing disinfection costs.

A well designed, installed and maintained filtration system will prolong the life of an irrigation distribution system. Installation of the wrong filter type, or one not sized appropriately can lead to poor performance, resulting in increased irrigation and filtration maintenance, production losses, additional labour costs, shortened equipment life, and increased energy consumption.

Pumping systems can be damaged by debris and contaminants in the irrigation water. Solenoid valves can become slow to operate, or become locked in either the open or closed position. Particles can affect the efficient operation of a solenoid valve by not allowing the solenoid diaphragm to seat properly, or blocking the small water control channels within the solenoid.

The selection of a filtration system should be a considered and measured purchase, utilising information collected and analysed on the site dynamics, the irrigation application system, the irrigation disinfection type and location, the topography, cropping systems and the water quality to ensure the most suitable filtration system is installed.

An irrigation system designer will discuss the filtration requirements with the business, and survey the nursery site looking for vital design information and considering the following criteria:

The water quality and contaminants present in water used for irrigation needs to be assessed to



decide what type of filtration is appropriate, and how the water quality varies over time. The pH and Electrical Conductivity (EC) values, and contaminants such as iron, sand, silt, clay, growing media, manganese, calcium, and organic materials including algae, invertebrates, vertebrates need to be measured and/or assessed. Changes can occur seasonally, according to rainfall or irrigation demand, but can also alter over extended periods as a result of drought or floods. Wherever possible the water quality samples taken should reflect the worst of the conditions that are likely to be encountered.

Surface water storages and wastewater collected from nursery production areas often contain chemical, organic and inorganic contaminants. The level of these contaminants can often be reduced by careful management of the water storage, reducing the pressure on the filtration system through the use of aeration, circulation and sediment traps.

The pumping capacity of the system needs to be measured and recorded. When selecting the location for the filtration system it's important to make note of the water flow and pressure at that point in the system. Water pressure and flow rates are reduced as the water is passed through each filter, and more is lost during filter cleaning and backwashing. Filter systems that require manual cleaning can also cause major problems if the filters are not cleaned as required resulting in

excessive build-up in the filter. The pumping capacity of a nursery irrigation system must be capable of operating the largest irrigation requirement while meeting the flow and pressure losses through the filters during normal operation, including cleaning.

Pumping from a water source to storage tanks, then pumping water from the tanks for irrigation, would most often have the filtration system installed between the source and storage tanks, provided there is sufficient flow and pressure to operate any automated cleaning or backwashing system. This is generally the most cost effective location for filtration systems, as the flow and pressure at this point in the system can be less than after the storage tank.

Locating a filtration system between the nursery irrigation pump and the sprinklers or drippers is common. However, this can interfere with emitter operation, particularly when a portion of the water flow and pressure is used for backwashing, or the filter becomes partially clogged. This type of filtration system may require greater filter surface areas and larger pumping capacity, leading to an increase in capital cost and increased energy and operating costs.

Sprinklers and drippers have manufacturer's recommendations on the degree of filtration required to ensure the untroubled operation of the emitter. The filtration requirements can be sourced from the manufacturer, or from specification sheets for the emitter. The degree of filtration is measured in microns. However, the filtration requirement for some sprinkler and drip emitters originating from outside Australia will be measured as a screen mesh size. e.g. 150 microns = 100 mesh, 100 microns = 155 mesh.

Select the appropriate filtration system, as no single filtration system or type is suited to all applications. A filter that operates successfully in one nursery situation, may not operate efficiently in

another seemingly identical location. Filtration should be a staged process, with progressively finer filtration being applied to reduce the strain on individual components, and protect different parts of the system e.g. foot valve strainer, media filter, disc filter and in-line filters.

The purchase price alone does not guarantee the efficiency of a filter system. A high priced system that's not sized correctly, or is unsuitable for the water quality being filtered may be just as inefficient and troublesome as a low priced system

with maintenance problems and lots of downtime. A nursery filtration system is generally judged to be a long term capital expenditure, with growers expecting many years of trouble free operation from their system, but this can only be achieved by installing the right system.

Maintenance of filtration systems is just as important as the initial selection of the filter, and regular maintenance must be programmed to ensure continued trouble free operation. Even automated filtration systems require regular maintenance,

lubrication of parts, testing of valves and checking of the integrity of filtration surfaces to ensure trouble free operation.

Pressure gauges installed on the inlet and outlet of a filter system will identify the pressure loss across the filter, and quickly identify a build up of contaminants and help to identify emerging maintenance problems.

For more information on filtration see the industry guide 'Managing Water in Plant Nurseries' and the WaterWork workshop.

Lex McMullin
Farm Management Systems Officer
Nursery & Garden Industry Queensland

