

Nursery Filtration for Nursery Irrigation

(Part II continued from last month)

Filtration is an essential component within an efficient and effective nursery irrigation system.

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 purchase and installation of the most suitable filtration system.

The nursery filtration system is generally judged to be a long term capital expenditure with growers expecting many years of trouble free operation from their filtration system.

Some common filtration systems in operation in production nurseries include:

Pump intake screens are predominately used to prevent the larger aquatic animal and weed species from entering an irrigation system from any surface storage. These screens are attached to the suction side of the pump and primarily provide protection for the pumping system. Self cleaning pump intake screens are available and these utilise water pressure to clean the filter screens.

Fish traps/leaf strainers are often installed to remove small aquatic animals, trash and leaf litter to protect the pumping system and to reduce the pressure on the rest of the filtration system.

A centrifugal sand separator or hydro-clone is most commonly used when pumping from wells and bores that contain large amounts of sand. The filter is installed on the suction side of the pumping system to prevent damage to pumps and valves, and also acts as a pre-filter to reduce the filtration requirement on other filters within the system. These centrifugal sand filters should be monitored regularly but are usually self cleaning and trouble free.

Screen/mesh filters are historically the most common form of filtration used for removing foreign material from irrigation water in nurseries. These screen/mesh filters are often used beyond their limits and have been popular because they are inexpensive, versatile, easy to install, and are compact in size when compared to other filter types. Screen/mesh filters can be used as the key filtration system, but are most often providing the secondary filtration in conjunction with media filter systems. Filter cleaning can be completed manually or can be automated, however the screen/mesh will periodically require hand cleaning to remove contaminants not removed by the normal manual or automated cleaning processes.

These filters operate successfully removing medium loads of inorganic hard contaminants, however organic contaminants such as algae, mould and slime, along with chemical contaminants can cause problems for this filter type. Chemical contaminants, such as iron or calcium precipitating out of the water can cause issues as these single surface filters have a limited capacity to store contaminants before cleaning is required. Organic contaminants present in the water often embed themselves into the filter mesh and do not readily release from the filter screen particularly during automated cleaning process causing frequent and excessive flushing.

Disc filters can successfully remove inorganic contaminants, and if sized, operated and maintained correctly will also remove some organic contaminants. Disc filters consist of a series of ribbed discs packed tightly on each other and compressed in a cylinder. A close up of each ribbed disc will reveal that each rib on the disc contains a series of sharp points capable of catching organic contaminants. When in operation, water is forced between the discs, and contaminants are filtered out when they are unable to pass through the gaps and the organic material collects on the sharp points of the ribs. Disc filters are efficient in removing contaminants in support of other filtration systems, and often provide the final filtration in drip irrigation and propagation mist systems. For automated cleaning, the filter discs are separated from each other, allowing the filtered contaminants to be flushed out through a flush outlet, while manual cleaning requires filter removal and high pressure hosing of the discs.

Media/sand filters are fast becoming the central feature of most nursery irrigation systems, particularly systems that utilise recycled irrigation water. These filters clean the water by forcing it through a container filled with small, sharp edged 'media'. Water is passed through the small spaces between the media grains and any contaminates are stopped when they can no longer fit through the spaces.

Media/sand filters are usually more effective in removing fine sediments, suspended organic material and chemical contaminates, and are generally cleaned by manual or automatic backwashing. The media/sand filter offers the advantage of a bed of media/sand (eg. crushed, sharp edged silica sand, quartz sand, anthracite, garnet, or magnetite) to provide depth filtration. This depth provides longer system run times between flushing, gives more filtration area, easier organic contaminate release from the filter bed, and a finer level of filtration.

Media filters are recognised as being reliable and require minimal maintenance when sized and installed correctly. Proper sizing of media/sand filter is crucial to system performance, with over-sizing of the filter causing channelling in the filter bed, and under-sizing causing coning in the filter bed. Water introduced into the media/sand filter at too high a velocity can over time remove the sharpness from the media reducing its effectiveness.

A number of media filters are often installed together to provide the required irrigation flow rates and to ensure system pressure is maintained during cleaning sequences. Media filters are cleaned by backwashing, forcing water to flow backwards through the filter, lifting and separating the media, freeing any contaminates and washing them out of the flush valve. Backwashing of the media/sand filter system is usually designed to operate one unit at a time using the clean water from the other units to backwash each filter unit in sequence while maintaining irrigation system operation. (single media filters with automated backwash may pass unfiltered water through the irrigation system during this process if not designed correctly).

Membrane filtration such as micro, ultra, nano and reverse osmosis are tailored to specific applications. All types of membrane filtration require sufficient pre-treatment of the water to remove the major organic and inorganic contaminates before the membrane technology can be successfully used. Micro, ultra and nano membrane filtration is used primarily in filtering pathogens from the water, while reverse osmosis is primarily used to remove salts.

When selecting a filtration system for your nursery irrigation system you should consider the advantages and disadvantages of each system and obtain advice from a qualified irrigation specialist before purchase. A properly selected, sized and installed filtration system is a valuable management tool. Understanding the equipment's capabilities and limitations will maintain the efficiency of the operation of the entire irrigation system.

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