



Nursery & Garden Industry
Queensland

Irrigation System Maintenance

An irrigation system can only apply water uniformly and regularly enough to meet crop requirements if it is operating to the design specification. Whether the system is an overhead, drip, boom, bottom-up, or capillary irrigation system, a maintenance plan must be put in place to ensure the system is operating at peak efficiency.

Some of the common problems that can arise in an irrigation system without the grower being aware of them are;

- *irrigation events occurring outside the programmed events*
- *planned irrigation events not occurring*
- *irrigation events in different zones occurring together, reducing system flow & pressure*
- *individual sprinklers not operating correctly due to blockages*
- *filter systems clogging, thus reducing system pressure and flow*
- *automated filter backwashing interfering with irrigation events*
- *sprinkler filters/strainers clogging*
- *incorrect operating pressure within the system*
- *lack of suitable flow to operate expanded irrigation zones*
- *individual laterals being turned off via a tap or gate valve*
- *unused and unwanted solenoids, gate valves and taps being accidentally left open*
- *leaks that only occur during system operation.*

Regular evaluation and maintenance are essential parts of operating an efficient and effective nursery irrigation system. Even the most expensive systems require regular measuring, evaluation and maintenance to provide satisfactory long term performance. Industry programs under the Nursery Production Farm Management System highlight the need for, and recommend, regular programmed

irrigation system evaluation and maintenance to ensure trouble free operation.

A well-considered maintenance plan will include some or all of the following;

- *regular visual inspections of the irrigation system both operating and not operating*
- *managing leaks and breakages*
- *regular assessments of irrigation controller operation*
- *regular pressure testing at the pump and irrigation zones*
- *pump inspections and servicing*
- *filter backwashing and cleaning*
- *disinfestation and treatment system inspection and servicing*
- *maintenance of filters, pipes and emitters*
- *main and lateral line flushing*
- *sprinkler alignment checks*
- *emitter nozzle cleaning*
- *scheduled full system performance evaluations*
- *recording water use*
- *irrigation water quality testing.*

Regular monitoring of the irrigation system is the prime component in a comprehensive maintenance plan, and can assist in detecting system problems, emerging performance issues and identify any requirement for further maintenance, system upgrades or repairs.



Visual observations of sprinkler performance should be conducted regularly. All nursery staff should be encouraged to notify the irrigation manager immediately if they encounter any unusual irrigation performance issues during their daily work tasks. The performance and growth of plants within a production area is another indicator of system performance. The systematic checking of the crop using visual observations, combined with physically picking up key plants in an irrigation zone to assess their weight, will quickly alert a grower to current or emerging issues.

System leaks and breakages should be repaired immediately to prevent escalating problems, and in some cases complete system failure. Small water leaks at pipe joins and threaded couplings are frequently early warnings of potential underlying larger issues. Constant wet and boggy areas are often an indication of leaks or pipe breaks under the ground, as is unexplained pump operation.

Irrigation controllers should be regularly and routinely checked to ensure irrigation programmes or events are installed and run as planned. Backup batteries should also be replaced regularly to ensure irrigation programs are not lost during power outages.

Irrigation system pressures at both the pump, and most importantly at the sprinkler, should be conducted regularly, with these readings being recorded to provide a history of efficient operation should future problems arise. Under the Nursery Production Farm Management System, the environmental management program EcoHort recommends growers should test irrigation line pressures monthly. Pressure measurements should also be taken at the inlet and discharge of filter systems to identify filter performance issues.

Pumps and pumping systems should be inspected regularly, and any problems addressed immediately. Observing the pumping system, looking for leaks and listening to the pump in operation, can sometimes identify early emerging pump issues. A programmed service routine should be conducted by qualified technicians on the pumping system, with pump seals, bearings and O-rings checked regularly. Flow

switches, back valves, water meters and other inline devices should also be frequently inspected to ensure they are operating correctly.

Good filtration is recognised as the key to trouble free operation of nursery irrigation systems. Well managed filtration systems reduce sprinkler blockages and variations in pressure and flow, that lead to poor system performance and uneven water application. Filters should be cleaned at least once a week depending on system operation and demand, and automated cleaning or backwashing should be monitored regularly to ensure correct and efficient operation. Automated filter backwashing activated by time or flow volumes often require more frequent cleaning, particularly when the irrigation water quality changes due to weather events or on-farm activities. Regular visual checks of the filters should be conducted to evaluate the condition of filter screens, mesh, discs or sand/media. The sand, gravel or other media contained in media filters requires replacing at intervals, as shown in the user manual or identified by the supplier or installer.

Disinfestation and treatment system operation should be monitored regularly to ensure efficient operation. Regular visual inspections can alert growers to many emerging problems and issues. Regular servicing of injection pumps is required, often at periods of six to twelve months, depending on usage.

Flushing of main lines and laterals can reduce the waste material and biofilm build up in irrigation lines, that can potentially block sprinklers and impede performance. Material can accumulate in irrigation lines from sediments building up over time, and from pipe breaks and repairs, with soil particles and pipe filings often caught in the main lines and ends of laterals.

Most emitters used in nursery production are designed and manufactured to perform to specifications when operated within a specific pressure and flow range. To deliver uniform irrigation application the irrigation system must meet these pressure and flow requirements when

initially installed, and throughout the entire life of the system. Regular testing of the system pressure at each irrigation zone provides an indication of current system performance and recording these results can highlight trends, or identify any deterioration in performance over time.

The sprinkler risers and droppers in each irrigation zone should be inspected regularly to ensure they are secured in place as originally installed. Sprinkler systems that are not aligned correctly will not provide a uniform irrigation application as designed and installed. The irrigation sprinkler riser can sometimes be bent at various angles, caused by on-farm activities including impact with trolleys and trailers. Inverted sprinklers inserted into the laterals may not hang down as installed due to lateral pipe twist over time.

When purchasing replacement sprinklers or drippers from a reseller, be sure to check each emitter before leaving the store, as often these emitters are mixed in the box or tray as customers scramble to find the one they are searching for. Placing the incorrect mismatched emitter into an irrigation zone will not provide a uniform irrigation application. Sprinklers in the field should be checked for correct installation if performance is not to specification.

Having the irrigation system designed, installed and operating to industry best management practice (BMP), ensures the system is capable of irrigating uniformly at an application rate the growing media can absorb. System operation to industry BMP permits the system to be monitored for continued performance over time. Three simple parameters benchmark an irrigation system to nursery industry BMP ; Mean Application Rate (MAR), Co-efficient of Uniformity (Cu) and Scheduling Co-efficient (Sc).

It is recommended in the EcoHort guidelines that the full irrigation system performance be tested against industry BMP parameters at six monthly intervals, and the results recorded. This can be achieved by conducting a catch can evaluation of the irrigation system.

Recording the total water use at regular intervals from an installed water meter can identify

differences with historical water use data, alerting growers to possible unexpected irrigation system issues. Monthly water usage above or below the monthly average may indicate an emerging problem, providing the opportunity to manage the problem before it becomes greater and leads to crop losses. The EcoHort program recommends that total irrigation water use be monitored monthly.

Measurements should also be taken and recorded regularly on the water source quality ,and the performance of the irrigation water disinfection system. EcoHort recommends 6 monthly full analytical water testing, and monthly pH, Electrical Conductivity (EC), nitrate and phosphate tests on water sources. Water disinfection and treatment systems should be checked by appropriate testing at least monthly to ensure water is being adequately treated.

This technical article includes a system checklist that can be printed and used to methodically check an irrigation system to find maintenance issues before they impact on the efficiency of the system.

More information on irrigation system maintenance can be obtained from the publication 'Managing water in plant nurseries' and the NIASA and EcoHort guidelines.

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IRRIGATION SYSTEM MAINTENANCE SCHEDULE

Business Name:

Business Address:

Date:

Item	Specifications		Operational Test	Interval	Operational Test Result
Foot valve	Size		Leakage	12	
	Model				
Suction line	Diameter		Leakage	12	
	Class				
	Length				
Bore	Motor		Electrical connections	12	
	Pump		Current draw	12	
	Depth		Power consumption	12	
	Pressure tank size		Test and Tag	12	
	Standing Water Level		Pump operating pressure	6	
	Sustainable Yield		Pump operating	6	
			Leakage	6	
			Pressure tank pressure	6	
			Bore drawdown	6	
			Pipe connections	6	
			Standing Water Level	6	
Pump			Sustainable Yield	6	
	Pump Location		Pump foundation	12	
	Check valve		Electrical connections	12	
	Bypass		Current draw	12	
	Motor		Energy consumption	12	
	Pump		Test and Tag	12	
	Inlet size		Pump operating	6	
	Outlet size		Pump operating	6	
	Pressure tank size		Leakage	6	
	Best Efficiency Point		Pressure tank pressure	6	
			Pipe connections	6	
		Noise/vibration	6		

Item	Specifications	Operational Test	Interval (months)	Operational Test Result
Pump control systems	Variable Frequency Drive	Electrical connections	6	
	Pressure control	Pump cut in and cut out pressures	6	
	Flow control	Current draw	12	
	High temperature cutout	Power consumption	12	
	High & low pressure cut out settings	High temperature cutout	12	
	High & low flow cut out settings	High and low flow cutouts	12	
	Motor protection			
Filter	Manufacturer	Electrical connections	6	
	Type	Leakage	6	
	Capacity	Pressure differential	6	
	Element micron size	Element/ media condition	12	
	Media size and type	Element/ media replacement	36	
	Pressure differential setting	Body condition	12	
Injection systems - fertiliser and treatment	Manufacturer	Electrical connections	12	
	Model	Current draw	12	
	Type	Power consumption	12	
	Output	Leakage	3	
	Control systems	Pulse output operation	12	
	Water meter with pulse output	Test and Tag	12	
		Valve replacement	6	
		Diaphragm replacement	6	
		Mounting security	12	
Treatment systems	Manufacturer	Electrical	12	
	Model	Current draw	12	
	Type	Power consumption	12	
	Output	Leakage	3	
	Control systems	Pulse output operation	12	
	Water meter with pulse output	Test and Tag	12	
		Valve replacement	6	
		Diaphragm	6	
		Mounting security	12	

Item	Specifications		Operational Test	Interval (months)	Operational Test Result
Storage tanks	Type		Tank base condition	12	
	Size		Tank leakage	12	
	Lining material		Liner condition	12	
	Base material				
Pipework - Mains	Size		Leakage	6	
	Class		Condition	12	
	Length				
Pipework - Sub mains	Size		Leakage	6	
	Class		Condition	12	
Pipework - laterals	Size		Leakage	6	
	Class		Condition	12	
Sprinkler	Manufacturer		Operation	Daily	
	Model		Sprinkler model, plate and jet size uniformity	12	
	Jet size/ colour		Operating pressure	6	
	Plate/spinner		Flow rate	6	
	Spacing		Leakage	6	
	Riser/dropper height		Mean Application Rate	12	
	Operating pressure		Coefficient of Uniformity	12	
	Flow rate		Scheduling Coefficient	12	
	MAR				
	Cu				
	Sc				
Dripper & arrow or spray stake	Manufacturer		Operation	Daily	
	Model		Dripper model uniformity	12	
	Dripper flow rate		Operating pressure	6	
	Arrow		Flow rate	6	
	Spacing		Leakage	6	
	Operating pressure		MAR	12	
	MAR		Cu	12	
	Cu		Sc	12	
	Sc				
Solenoid	Brand		Electrical connections	6	
	Size		Zone pressure	6	
	Flow regulator		Zone flow	6	
			Pressure variation across zone	6	

Item	Specifications		Operational Test	Interval (months)	Operational Test Result
Irrigation controller	Brand & model		Electrical	12	
	Stations		Current draw	12	
	Programmes		Power	12	
	Rain Sensor		Solenoid operation	6	
	Other features		Test and Tag	12	
	Wiring				
Operating instructions, manuals and maintenance instructions	Pumps and motors		On file	12	
	Bores and motors		On file	12	
	Pump control		On file	12	
	Filters		On file	12	
	Injection pumps		On file	12	
	Water meters		On file	12	
	Tanks		On file	12	
	Irrigation pipe		On file	12	
	Sprinkler spec		On file	12	
	Dripper spec		On file	12	
	Solenoid specs		On file	12	
	Irrigation		On file	12	