



# Irrigation System Selection

The selection of the appropriate irrigation type for nursery production requires careful consideration of a range of factors. The following table shows the relative advantages and disadvantages of each system type, and can be used as a guide in selecting the most appropriate system for a given situation.

Parameter	Drip	Bottom up	Ebb and Flood	Spray stakes	Upright sprinkler	Inverted sprinkler	Misters	Fog
Efficiency	Excellent	Excellent	Excellent	Very high MAR	Moderate	Moderate	Moderate	Good
Quality of water required	High	High	Medium	Medium	Medium	Medium	Very high	Very high
Relative quantity of water required	Low	Low	Low	High	High	High	Low	Low
Recycling required	No	No	Yes	Yes	Yes	Yes	No	No
Relative capital cost	High	Medium	High	High	Low	Low	High	High
Infrastructure requirements	High	High	High	Medium	Low	Medium	High	High
Pumping capacity	Low	Low	High	High	High	High	Low	High pressure
Running costs	Low	Low	Low	High	High	High	High	High
Automation necessary	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Filtration capacity required	High	Medium	Low	Medium	Medium	Medium	Very high	Very high. Backup filter on pump
Maintenance requirement	High	Medium	Low	High	Low	Low	High	Medium- high with age
Maintenance labour	High	Medium	Low	Medium	Low	Low	High	Low-medium with age
Crop access	Some difficulty	Good	Good	Some difficulty	Good	Good	Good	Good
Frost protection	Nil	Nil	Nil	Nil	Good	Good	Not applicable	Not applicable
Foliage disease prevention	Excellent	Excellent	Excellent	Excellent	Poor	Poor	Poor	Poor
Biofilm growth	Low - Moderate	Moderate	Moderate	Low	Low	Low	High	High
Humidity control	Poor	Poor	Poor	Poor	Moderate	Moderate	Good	Good
Wind effects	Nil	Nil	Nil	Nil	Moderate	Moderate	High	High
Suitable container sizes	Medium to large	Small	Small	Very large	Small to medium	Small to medium	Propagation	Propagation

Selecting the appropriate irrigation type and designing an irrigation system can be broken down into a series of steps.

**System pressure and flow.** System pressure and flow rates directly influence emitter selection through their effects on droplet size and wetted radius. Pressure and flow rates should be tested at a location as near as possible to the irrigation zone, not at the pumping station. The irrigation system, including main supply lines, pipes and fittings, should be designed to ensure the pressure and flow rates can be maintained throughout the system.

**Emitter configuration.** Determine an emitter configuration suited to the proposed production and cropping type e.g. upright sprinkler, inverted sprinkler, or drippers. The container size, height and density of mature crops, along with the ceiling height of any structure will influence the selection of either an upright or inverted sprinkler, or if drip irrigation is more suitable.

**Droplet size and pattern.** Sprinkler droplet size can influence plant canopy penetration and how wind affects the distribution pattern. Sprinklers producing larger droplets provide improved canopy penetration and will be less affected by wind. Single stream rotator sprinklers are generally selected with extremely dense canopy situations and wide sprinkler spacing. Test and decide on a droplet size suitable to the cropping type and wind conditions and select a droplet size to match grower preference and experience.

**Select a preferred emitter spacing.** Close emitter spacing requires many fittings and emitters, and close upright sprinkler spacing creates additional obstacles to production, equipment movement and mechanisation. To operate efficiently, wide sprinkler spacing requires larger droplet sizes that contact the growing media surface with a high speed, causing compaction and splash of media. Wider spacings may also make sprinklers more wind affected. Obstacles such as posts, ceiling height, and pathway locations can interfere with supply pipes or sprinkler locations at the intended spacing.

Select either a full or part circle sprinkler pattern, and establish if road guards are required. Road

guards can redirect irrigation water falling outside of the growing area away from roadways and sensitive areas.

**Sprinkler height** should be such that sprinkler stream is not intercepted by the crop or other obstacles such as shadehouse roofs, is not excessively high to minimize wind effects, and can be adjusted if cropping type changes.

**Water quality.** To ensure continued trouble free performance, check the manufacturer's specifications for water quality to establish the level of filtration required. A water test may be required to determine if additional treatments or filtration are required.

**Industry BMP parameters.** Irrigation system performance parameters have been established to ensure the system is operating both effectively and efficiently to industry best management practice.

**Mean Application Rate (MAR) 10 – 25mm/hr**  
**Co-Efficient of Uniformity (Cu) >85%**  
**Scheduling co-efficient (Sc) <1.5**

The industry BMP parameters can be supplied to irrigation designers and installers as a reference standard. These performance parameters can be included in payment contracts for new installations.

**Emitter selection.** Choose an emitter that meets all the requirements in the selection steps above, is readily available, fits within budget, and has acceptable maintenance requirements. To assist with emitter selection and design, specification sheets are available from emitter manufacturers.

**Irrigation controller capacity.** Ensure sufficient controller stations are available to include additional irrigation zones. Modules can often be added to irrigation controllers to expand capacity.

*Lex McMullin*  
*Farm Management Systems Officer*  
*Nursery & Garden Industry Queensland*