Department of Primary Industries

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Aspects to consider when choosing an irrigation system for horticulture

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Irrigation system selection is an important aspect of setting up or upgrading horticultural enterprises. There are many different types of irrigation systems available, and in many cases there is no single best solution for any given situation. Each irrigation system type has its advantages and disadvantages, depending on the situation, and it is often necessary to make a series of compromises.

Keeping an open mind to all available options may complicate the selection decision, but it will ensure that a more suitable, or even the best, choice of system is not overlooked as a result of existing preferences by the owner, irrigation designer or consultant.

Selecting a suitable irrigation system requires consideration of a number of key parameters that are specific to each irrigation enterprise. For example, you may wish to adopt drip irrigation but are located in a communal irrigation supply scheme which supplies water too infrequently or inflexibly for drip irrigation to be successful. Unless a water storage is built, a full cover system such as low level sprinklers may be the only option in this situation.

Irrigation system selection is also influenced by crop type. For example, you may like to grow a cover crop in a citrus orchard, therefore low level sprinkler irrigation may be the most suitable option. Also, the crop may be sensitive to heat and sunburn so overhead sprinklers or misters may be necessary. In many high value crops, a dual system (for example drip and overhead sprinkler/mister irrigation on the same orchard) is becoming a popular choice enabling the advantages from both systems to be utilised.

It is often very helpful to inspect and compare existing systems that are working well in situations similar to your own.

When considering the advantages and disadvantages of different systems, you should also consider your style of management. What do you hope to achieve by upgrading your system? It is easy to be impressed by the latest technology or other impressive systems, but is it right for your situation and management style?

The three main pressurised irrigation systems suitable for horticulture include overhead (or above canopy/solid set) sprinkler, low level (or under tree/canopy) sprinkler and drip irrigation. When compared with furrow and flood irrigation, these systems share some key advantages, namely:

- more even water distribution
- greater control over the amount of water applied
- automation
- more efficient management practices, for example, minimum tillage and fertigation
- lower labour requirements.

Overhead sprinklers

Advantages	Disadvantages
Low labour and maintenance required. Functioning sprinklers are easily sighted.	Relatively more prone to poor distribution uniformity (DU). If fertigation is used, the results of poor DU will be further exacerbated.
Can be used for frost control and canopy cooling.	Wind reduces efficiency and DU. High evaporation losses on hot, windy days.
Allows easy establishment and maintenance of cover crops.	Can create conditions conducive to disease development. As a result overhead irrigated vineyards often require more fungicide applications.
	Can damage susceptible crop types through splitting and marking, particularly close to harvest.
	Relatively high pumping costs compared to low level sprinkler and drip.
	Wetting of foliage leads to salt uptake in leaves (especially in citrus).
	High sprinkler output and slow soil infiltration may lead to run-off. Not well suited to heavy clay soils due to surface sealing.
	Least suited to high precision management such as regulated deficit irrigation (RDI).

Figure 1. An overhead sprinkler system irrigating grapevines

Low level sprinklers

Advantages	Disadvantages
Minimal wetting of fruit and foliage.	Checking sprinkler operation can be labour-intensive.
Wind effects minimised.	Canopy management and weed control is necessary for good water distribution.
Suited to most soil types.	More susceptible to physical damage from pickers and machinery than overhead sprinkler.
Lower pumping costs than overhead sprinklers.	
Some frost control and canopy cooling possible.	
Well suited to fertigation.	

Figure 2. Low level sprinkler operating in a citrus orchard

Drip irrigation

Advantages	Disadvantages
Highly suited to fertigation.	Requires highly frequent irrigation, therefore a flexible and frequent water supply system is necessary.
Low pumping costs.	High degree of filtration required.
Large water savings in young plantings due to accurate and even water placement.	Establishment of cover crops reliant on autumn rain or dual system.
Reduced need for fungicide sprays.	Little margin for error. Plants stress quickly if the system fails or watering is delayed.
Potentially the most water-efficient system.	Unsuited to frost and heat control.
Allows access to orchard at all times.	
Highly suited to precise irrigation scheduling.	

Figure 3. Drip irrigation of citrus

Figure 4. Dual irrigation system (drip and overhead sprinkler) on a citrus orchard

More information

NSW Agriculture 2002 Irrigation for Horticulture in the Mallee

Selecting an irrigation system. PROwater Irrigation Training Series. Module 2

Acknowledgments

Jeremy Giddings Irrigation Industry Development Officer (Horticulture)

Based on WaterWise on the Farm, Series 2: Irrigation Systems 2004

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