

In many cases, the over-riding factor to improving water use efficiency is not by adopting improved irrigation and draining systems but by improving the education and management of existing systems . . .

How well do you manage your irrigation systems?

AS SUMMER arrives, the importance of good irrigation management to supply optimum water to grow and maintain healthy plants is apparent, no matter where and what the situation.

Take yourself back six months or so and the opposite applies – the need to restrict the supply of water to keep plants healthy in the cool, low-evaporation conditions of Winter.

One aim of this article is to raise awareness by encouraging you, the reader and person irrigating, to think and then change your behaviour to an improvement process of “plan, do, check, review” so it becomes a culture. After all, the person who controls the irrigation controls the profit.

Applying water

How water is applied is only one part of having a water-efficient nursery, garden centre or landscape. It is important for you to think about the plants you grow, the growing media/soil they grow in (their root zone environment), mulches and other plant growing practices.

This article focuses on having you

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consider how you water – it is not a comprehensive review of irrigation for retail garden centres or production nurseries.

There are four basic principles of good irrigation:

- Apply the right amount of water for the plants in the growing media/soil they are growing in.
- Apply the water at the right rate for the root zone to retain it.
- Time the watering so that it meets the changing weather conditions.
- Apply the water evenly to all the plants being watered.

For many, water use efficiency is an area often neglected as the initial design (often buy a said expert) and implementation of a system is all they have to demonstrate the theoretical performance, rather than the documented irrigation performance post-system installation.

Consider the flow rate of the hand-held watering tool and the time applied to a pot and whether a multiple pass can be used to limit the infiltration loss to save water and keep plants happy and healthy



A full audit of your watering systems occasionally is worthwhile to check

When was the last time you tested the irrigation system performance – tools such as pressure gauge, cup tests and stopwatch to measure application rate, uniformity and optimum pressure for each sprinkler?

Plants can only use water where the plant roots grow. They can't use water anywhere else in the root zone if it is not available, ie, in a recently potted plant where the roots are in the top and not the bottom of the container or where irrigation drains beyond the active root zone.

This means the plant root zone contains all the water the plant can draw on; the challenge is to manage when and how much you water irrespective of the irrigation system and technique so that there is always some available water in the root zone of the plant.

If the root zone dries out your plants may become stressed, lose or gain quality and at worst could die. It is worth noting that it is much harder to meet water needs in the small root zone of a small plant container with a large leaf area and it is easy to over apply water in seedling containers.

If you overfill the root zone then you are wasting water through run-off or drainage. However, in certain situations, this drainage may be of

benefit to facilitate some leaching of accumulated salts.

As well, most plants don't like waterlogged root zones, so you risk root rot and disease if you put on too much water too often and do not allow a drying cycle.

Tip: consider, how big is the reservoir and the water holding capacity of the pot and also, pick it up and check as a quick guide to water content and availability.

What happens to water in the root zone?

Water can be added to the root zone through rain or irrigation via many different irrigation techniques – sprinklers, drippers, capillary and hand watering.

It is lost from the surface through evaporation and used by plants as they grow naturally, a process called transpiration. It can also run off the surface and drain through the root zone without being absorbed if applied too quickly.

Evaporation changes on a daily basis 0 to 15 mm from least to high, impacted by solar radiation, temperature, humidity and wind – however, we rarely see managers modifying the amount and frequency of water applied to plants.

Tip: know the site evaporation and adjust irrigation accordingly to save water and optimise plant health.



efficiency and minimise wastage

The amount of water stored in the root zone depends on your growing media/soil properties and how deep the root zone is – you cannot water seedlings like 1000 litre pots.

Your challenge is to manage irrigation so that the amount of water in the root zone stays between empty, the point where the plant dies, and full, which is the point where water is lost either through drainage, run-off or evaporation and air supply (in the root zone) is at its lowest.

The easiest way to do this is with a modern, efficient irrigation system which considers the site conditions and plant requirements, versus irrigating on time

Modern growing media in containers have the ability to readily accept and drain water and not become waterlogged with infiltration rates commonly above 1500mm/hour or 1500 litres of water applied per square metre in an hour – wow, that’s a lot.

By example, the flow rate of a hand-held hose, with or without a water breaker, may be 5 litres to 20 litres minimum, or 300 to 1200 litres per hour, displaced over a small to moderate wetting front – that’s a lot of water.

The major restraint of growing media though, just like soils, is their

ability to retain water applied to them – typically 5mm to 25mm per hour, so up to 25 litres per square metre.

Not all soils are the same and not all modern growing media are the same, so you need to be aware of their properties and be able to manage each growing media from supplier to supplier.

Also, consider the container sizes with the influence of gravity to drain water and root zone volume for the amount of available water on offer to the plants.

The complete disparity of optimum irrigation between hand-held watering and a well designed sprinkler system is explained hereafter.

A hand-held watering flow of 600 litres per hour (10 litres per minute minimum flow) will be intensified over the small wetting area of a 140mm pot occupying 0.015sq m.

With a multiplier of 65 pots per sq m, this equates to perhaps 39,000mm per hour – crikey.

The message here is to consider the flow rate of the hand-held watering tool and the time applied to a pot and whether a multiple pass can be used to limit the infiltration loss to save water and keep plants happy and healthy.

What are the steps to efficient irrigation?

Design the system so that it can provide the right amount of water for your plants – even hand held watering may be improved by pressure and flow regulation and how long and frequently water is supplied or topped up.

Install the system to design specifications – no, this is not “apply it as fast as possible” – and operate the system at the right time for the right amount of time. In garden centres this can be a serious challenge for overhead systems. However, there should always be the ability to plan, do, check and review.

How often should you water?

Plant water use is determined largely by the weather and type of plant. Consider installing a weather station, going online to the nearest weather station, or setting up an evaporation pan. This will help guide decisions.

If you water for longer than it takes to fill the root zone you will waste water.

How long is that?

As a guide, if you put one standard bucket on to an area 1m x 1m you will be applying water to a depth of 10mm.

Tip: think of irrigation as “amount in millimetres per hour versus time”, ie, a 12mm/hour irrigation system running for 20 minutes delivers 4mm or 4 litres per square metre.

Operating the system

The main ways in which you can waste water are through evaporation and wind drift, putting water where it is not needed, and watering for too long.

The most common cause of waste results from watering too quickly and for too long if the system is not uniform to ensure the dry pot becomes wet and not matching the ability of the root zone to absorb the water being applied.

To help review irrigation it is important to carry out regular water audits so the information required is at hand and any shortcomings can be rectified.

An audit not only considers the physical elements but how water is managed.

To start an audit you need to consider the following key areas:

- Water sources
- Water quality
- Operational requirements
- Irrigation system
- System hydraulics
- Drainage recycling and management.

The aim of the audit is to highlight limitations and opportunities for optimising water use efficiency. A key area is to allow you to determine your current irrigation delivery and usage and whether you have a sustainable supply.

If found lacking the information gathered above can be used to identify the avenues required to address the issues.

Without appropriate and timely management to suit plant and climate needs you could just be wasting the potential benefits of investing in the most well-designed but unfortunately most poorly-managed system.

For more information see:
www.watertoolbox.ngi.org.au
 Also Watering Videos at
www.dramm.com

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