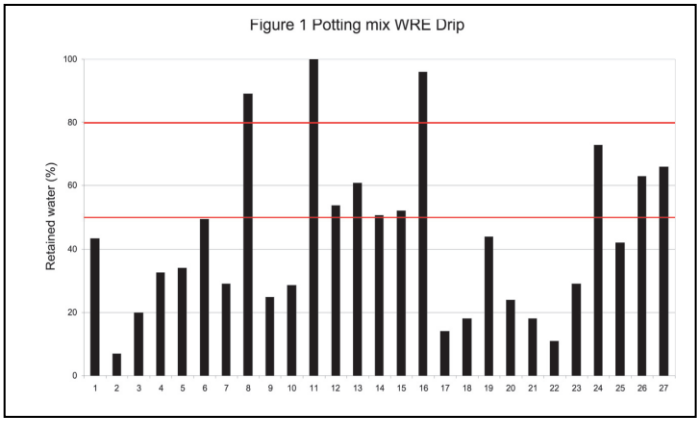
Water Retention Efficiency of Growing Media

Water retention efficiency (WRE) is a measure of the ability of a growing media to hold water applied from irrigation and this influences how long the irrigation must be run to wet up the media. An Australia wide survey has shown that the WRE of commercially available growing media varies considerably, and suggests that the choice of growing media can influence water consumption and the quantity of nutrient runoff produced from a sprinkler or drip irrigation system.

Overhead sprinkler irrigation is a relatively inefficient method of applying water to potted plants. Less than 25% of the water applied can ultimately be available to the plant, as more than 50% of the water falls on the ground between pots, on paths and other non-productive areas, and 25% of the water applied can also drain out of the pot before the next irrigation. Therefore, the longer the irrigation is run, the more water is lost due to water falling outside the pot and draining through the media. Consequently, media that take a long time to wet up add to the cost of production by increasing the amount of water that must be applied by at least four times the theoretical minimum. The extra run time adds to costs associated with increasing the capacity of drainage, storage, treatment and pumping systems, and leaching losses from pots increases plant nutrient requirements, reduces the quality of recycled water and increases environmental problems. With this in mind, it may be cheaper to use a more expensive growing media with better retention properties. For example, if a 30-minute irrigation can be shortened by 10 minutes, this will give approximately a 30% reduction in water use and an even larger decrease in runoff volume (up to 50%).



In Australia wide surveys, WRE was determined by measuring the volume of water absorbed by a growing media under standard conditions (see test procedure below). A WRE of 100% indicates that all the water was retained in the media and 0% indicates that all the water drained from the media. Large differences in WRE were observed between growing media. Of the 27 media tested, only 10 had a WRE over 50%. The three best media had a WRE better than 80% (only 20% of the applied water was lost as drainage) and the WRE of six of the medias was less than 20% (more than 80% of the applied water was lost as drainage). See Figure 1. This shows that a nursery using a media with a WRE less than 20% would make significant savings in water by changing to a media with a WRE greater than 80%.

WRE cannot be determined by observation, and isn't correlated with other media quality testing parameters such as wettability. The WRE of a growing media is determined by the following test.

Materials required:

A 135mm length of 60mm diameter PVC pipe (One end covered with fly screen mesh to retain the growing media), a plastic funnel, a beaker or plastic cup (with an opening large enough to accept the sample container) and a measuring cylinder.

Preparing the growing media:

Measure out 360ml of moist growing media and dry this out by spreading the material on a plastic sheet in the sun. Spray the dry media with 40ml of fresh water and store in a sealed container over night, shaking occasionally.

Testing the media:
Pour the moist growing media into the test container and drop it three times onto a solid surface from a height of 3 cm to consolidate the media. Carefully press down the surface of the media to make the density more consistent with the remainder of the media then place the plastic cup under the test container to collect any leachate. Using the funnel, apply 100 ml of distilled water over the surface of the media over a period of about four seconds. Allow the media to drain for 15 minutes or until it has stopped dripping. Then measure the volume of leachate collected in the tumbler. WRE(%) = 100 – leachate volume (ml).

For more information on water retention efficiency refer to The Nursery Papers – Issue no 2002/7 – Water Retention Efficiency of Potting Mixes.

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