

## Hand Watering Efficiency

Hand watering is a common practice in many production and retail nurseries, with 55% of production nurseries using this method to some degree. Sometimes hand watering is regarded as an efficient irrigation method without full knowledge of the underlying principals and actual efficiencies of alternative methods. During 2008, DPI&F, Qld conducted an investigation into the efficiency of nursery irrigation practices on behalf of NGIA. This investigation surveyed a number of production and retail nurseries to examine labour costs and water use associated with hand watering, and compared it to the calculated costs of other irrigation techniques.

In the first part of this project, the hand watering methods of 2 production and 4 retail nurseries in South East Queensland were studied and flow rates measured. The results showed that application rates ranged from 19.2 to 62mm/hr. Best Management Practice Mean Application Rate (MAR) is less than 15mm/hr. Labour costs ranged between 2.29 and 17.4 cents/m<sup>2</sup>/irrigation event and water costs were 0.26 to 2.56 cents/m<sup>2</sup>. Depending on the nursery, this gave a total cost of between 2.55 and 19c/m<sup>2</sup>/irrigation event. This analysis didn't include pumping costs.

The second part of the study looked at labour and equipment costs for different irrigation systems. The measurement of hand watering costs was compared with overhead sprinklers, ebb and flow and capillary mat systems. These figures were calculated on an area of 100m<sup>2</sup> with systems being set up to BMP and calculated both labour and equipment costs. Table 1 summarises the calculated total costs of these different irrigation methods in the first and subsequent years.

The final part of the study looked at the importance of irrigation rate, compared water use in different irrigation systems and calculated costs.

Irrigation method	Cost of watering /m <sup>2</sup> Year 1 (highest cost) Labour + equipment	Cost of watering /m <sup>2</sup> Year 2 onwards - Labour + equipment
Hand watering	\$13.80	\$13.76
Overhead spray system	\$2.21	\$0.12
Ebb and flood	\$11.27	\$0.12
Capillary Matting	\$52.25	\$0.24

Table 1 Cost of Watering

Irrigation method	Annual water cost/100m <sup>2</sup>	Total Annual Cost Year 1/100m <sup>2</sup>	Total annual cost year 2 onwards 100m <sup>2</sup>
Hand watering at 50mm/hr MAR	\$437.78*	\$1,817.78	\$1,813.78
Overhead spray system at 12mm/hr MAR	\$101.81#	\$322.81	\$113.81

Table 2 Total Annual Irrigation Costs

The first step in this part of the study was to calculate the waste space between pots to calculate the amount of water that fell between the pots. This wasted space was 22.4% when 140mm pots were used. The water draining through the pots was then calculated relative to the irrigation rate e.g. a media with an absorption rate of 15mm/hr irrigated at 22mm/hr would drain at 7mm/hr. As the application rate increases, more water is lost as drainage, and consequently, more water needs to be applied to achieve

retention of 5mm of water in the pot. Using this information, calculations of water use over a range of application rates were made based on irrigating to achieve 5mm of water retained in the container. From these calculations, a cost of water was calculated for a number of MAR's on two different irrigation systems. An example of total costs of watering using hand watering and overhead sprays are summarised in table 2.

Overall, the study found that installing an efficient irrigation system uses less water and is more cost effective than hand watering. When hand watering, excessive drainage due to exceeding the absorption rate of the growing

media is a significant loss. The cost of hand watering is greater than any other irrigation system in terms of equipment, labour and water costs and should only be used in emergency situations and not be relied on as the main watering method. Methods such as reduced flow rate nozzles and trigger mechanisms can help to minimise the volume applied and water wastage between pots if hand watering is deemed as necessary.

More information on this project can be found in the Nursery Paper “Assessment of hand watering in production and retail nurseries” which can be downloaded from the NGIA website.

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