RURAL WATER USE EFFICIENCY
IRRIGATION FUTURES

Improving irrigation management for a profitable and sustainable future

Queensland Government

Supported by the Qld Government Department of Natural Resources and Mines

Irrigation, Drainage & Energy Management Plans (IDEMP) describe the infrastructure and management practices in operation at a production nursery and outline plans, designs, suggestions and opportunities for on-farm system and equipment improvements and upgrades.

IDEMPs support growers in nursery production to address both economic and environmental issues relating to water access, recycling, storage and use to ensure the business remains profitable and sustainable into the future.

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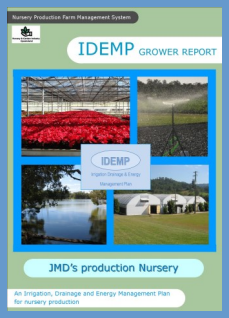

IDEMP
Irrigation Drainage & Energy Management Plan

Nursery & Garden Industry Queensland

The Pipeline

An electronic update on Nursery Production RWUE-IF project activities

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Nursery Production Rural Water Use Efficiency—Irrigation Futures (NGIQ RWUE-IF)

IN THIS PIPELINE
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Drip Irrigation Design and Management.

DRIP IRRIGATION VIDEO
http://www.ngiq.asn.au/technical-information/?did=286

DATE CLAIMERS
Brisbane Trade Day.
July 1st
The Marquee, Brisbane Showgrounds

Drip Irrigation

Drip irrigation has been the topic of conversation during on-farm visits across the state since the last issue of 'The Pipeline'. The positive market demand for nursery greenlife products over the last couple of seasons has encouraged many growers to plan production expansion within the scope of their current water resources, and drip irrigation is often seen as an efficient option.

Growers that have installed drip irrigation systems according to industry best practice have obtained water savings in excess of seventy-five percent when compared to overhead sprinkler systems, along with savings in fertiliser applications, and a reduction in pest and disease problems. The ability to apply the irrigation directly and efficiently to each container, schedule the irrigation application any time during the day or night regardless of wind conditions, while maintaining dry foliage was seen as a positive advantage with drip systems.


Drip irrigation system

While drip irrigation is an extremely efficient irrigation method for nursery crops, particularly for container sizes above 200mm, many growers reported negative past experiences. Growers acknowledged poor advice on drip irrigation systems as the major factor in the poor system performance. Many drip systems investigated applied irrigation at application rates far in excess of the ability of the growing media to absorb, causing channeling of water through the container, leading to high leachate volumes with high electrical conductivity values (EC).

Matching the application rate of the drip irrigation system to the absorption rate of the growing media (as with overhead irrigation systems) ensures the most efficient performance from any drip irrigation system. Reducing the flow rate of the dripper, pulsing the irrigation and using a premium quality growing media can deliver excellent results.

Drip irrigation has proven to be an efficient irrigation system because of the following reasons:

- minimum evaporation and wastewater runoff
- not adversely affected by wind
- suitable for a broad range of plant and foliage types,
- not affected by canopy density or size,
- ideal for irregular shaped growing areas
- suitable for a range of slopes and grades
- maintaining dry foliage during irrigation.

Technical articles and an information video on drip irrigation in nursery production can be found by visiting the NGIQ website (http://www.ngiq.asn.au/) and the 'Nursery Production Technical Information Library' page (http://www.ngiq.asn.au/technical-information/), and typing 'drip irrigation' in the 'search downloads' box in the top right of the page.

IDEMP Video and Technical Information
For an introduction to IDEMPs go to the following link to see a video explaining more—http://www.ngiq.asn.au/technical-information/?did=252. For technical information visit the NGIQ Technical Information Library at www.ngiq.asn.au/technical-information or click on the centre icon on the home page.

Drip Irrigation Design and Management

Drip irrigation on large stock

Drip irrigation has the potential to achieve significant water savings and improve plant quality, but, to achieve these improvements the system must be designed and managed correctly. As with sprinkler irrigation, the Mean Application Rate (MAR), Coefficient of Uniformity (Cu) and Scheduling Coefficient (SC) must be considered in designing these systems to achieve the best outcome.

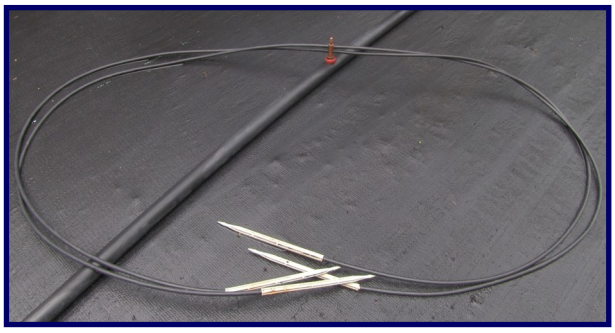
Flow rates from drip emitters are low compared with sprinklers, but, as all of the water is applied directly to the container, the system must be designed to ensure that excessive water is not applied. For example, if a 2 litre per hour dripper is used to irrigate a 200mm pot, an application rate of 63.7mm/hour results, which far exceeds the benchmark MAR of less than 15-20mm/hr. If the MAR exceeds the absorption capacity of the media the excess water cannot be absorbed, and the surplus water will flow through the media and out of the container.

The excess water applied also pushes the water already applied through the media which increases leaching. In practical terms, when there is an excessive MAR the media dries out more than would be expected, as insufficient water is being absorbed. When this happens, the reaction is usually to increase run times, as this is what would be done with a sprinkler system. However, increasing run times will only make the leaching problem worse as even more water is applied but still can't be absorbed by the media. If the media is drying out, and there are significant amounts of water flowing out of the pot, a number of strategies can be used to increase water absorption. The dripper flow rate can be reduced, the flow rate from each dripper reduced by splitting the flow from each emitter across a number of pots using manifolds, applications can be pulsed, or a combination of these strategies can be used. Pulsing is a technique whereby short, multiple run times are used to match the application rate to the absorption rate of the media.

Well designed and maintained drip systems can achieve CU's of greater than 95 percent and SC's less than 1.1, but the correct emitter needs to be selected to achieve these results. A pressure compensated, non-leak emitter (CNL) is a key component in any drip irrigation layout. These emitters reduce the variations in output through the system that are caused by pressure variations but, more importantly, they prevent the laterals from draining (non-leak) when the system stops. The non-leak function means that the lateral remains full of water when the system turns off, and this in turn means that every emitter starts at the same time when the system next starts. It also means that the line doesn't drain to the containers at the lowest point of the irrigated area. If non-CNL emitters are used on sloping sites, the application uniformity across the area will be even worse, as the laterals will drain through the lowest emitter, and when the system next runs the lowest emitters will start first and run for the longest time.

To achieve the most uniform distribution of water through the growing media in the container, an appropriate number of application points per container are needed. For growing containers above 300mm multiple application points need to be used, with the actual number being determined by the size of the container. Containers up to 200mm and 4L planter bags require 1 application point per container, 220 – 330mm and 25L containers 2 points, and 45L- 200L containers a minimum of 4 points. The usual way that this is achieved is to have a single emitter with a manifold to divide the flow of the emitter into multiple streams. The flow is then taken to the pot by the use of riser tube and a specially designed stake called an arrow.

Careful design and management of drip irrigation systems will pay dividends by decreasing water use and improving plant quality, particularly in large containers, and in areas where sprinkler layouts may be difficult to install.



Emitter, manifold, dripper tube, arrows

In the Pipeline for July/ August 2015

- Burnett/ Wide Bay, Sunshine Coast, Brisbane, Gold Coast and Lockyer Valley - IDEMP development
- Contacting businesses who have registered interest in having an IDEMP completed
- Brisbane Trade Day July 1st
- Video production— BMP growing bed construction