

NURSERY PAPERS

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REVIEW AND MAINTENANCE OF IRRIGATION

Water and irrigation is a critical part of any production nursery. Well-designed irrigation ensures that water is applied evenly and efficiently across a nursery's production areas, from propagation through to stock for sale.

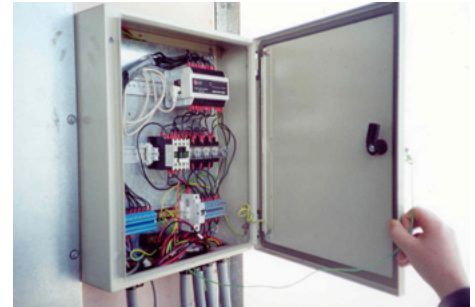
The ongoing evaluation and maintenance of irrigation is vital but often overlooked. An effective maintenance plan will result in better plant quality, as well as less plant variation and reduced manual handling costs.

In our October Nursery Paper, we covered the various types of irrigation methods available to production nurseries. Now, we look at how maintenance of irrigation systems can further improve efficiencies and lower costs in the long term.

Summary

- Regular measuring, evaluation and maintenance can result in less hand watering and plant handling, as well as less plant variation and better plant quality.
 - A water audit identifies key improvements to water sources, water quality, production requirements and system infrastructure.
 - Regular servicing of pumps and key components is best practice.
 - Maintain filters and valves in accordance with the manufacturers' recommendation.
 - Check sprinklers or emitters for water usage and operating pressure, and replace when performance declines.
 - The Nursery Production Farm Management System (NIASA) and EcoHort include useful maintenance checklists for production nurseries.
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- A comprehensive maintenance plan can be developed in consultation with an irrigation company or designer.

Source: Rolfe, C., Yiasoumi, W, Keskula, E. (2000) *Managing water in plant nurseries: a guide to irrigation, drainage and water recycling in containerised plant nurseries*, 2nd edn, NSW Agriculture.



Irrigation controller – Advantage Plant Production.

BACKGROUND

Irrigation systems differ for every nursery. Together with an irrigation designer, a business will decide which methods suit the needs of the site, taking into account its location, access to water and crops grown.

An efficient irrigation system ensures water is applied evenly and efficiency across the cropping area, and enables growers to more accurately schedule their irrigation times to meet crop requirements.

A system maintenance plan will not only ensure irrigation meets plant requirements, it will also encourage the business to be as water efficient as possible. Production staff can carry out regular maintenance, but a business may engage an irrigation specialist to develop a more formal plan and assist with the more technical aspects of system maintenance.

The process of evaluating and maintaining a nursery irrigation system can include conducting a water audit, measuring system pressures, analysing water quality, carrying out visual observations, recording water use, along with regular maintenance of filters, pipes, pumps and sprinklers.

Regular maintenance is an essential part of operating an efficient nursery irrigation system. Even the most expensive systems need ongoing measuring, evaluation and maintenance to guarantee long-term performance.

Source: Hart, S & McMullin, L (2015) *Ensuring the irrigation system operates efficiently in nursery production*, Nursery & Garden Industry Queensland.



DID YOU KNOW?

Observations made by Nursery & Garden Industry Queensland (NGIQ) found a number of on-farm issues associated with irrigation system faults, problems or issues that were reducing the effectiveness of nursery irrigation, often without the growers' knowledge. These included:

- Unplanned scheduled irrigation events occurring out of hours or planned events not occurring at all.
- Competing irrigation events impacting on system flow and pressure.
- Individual sprinklers not working properly due to blockages.
- Automated filter backwashing regularly occurring during largest irrigation operations.
- Individual laterals turned off via a tap or gate valve.

WATER AUDIT

NIASA is a best practice program developed for industry. It provides guidelines for growers to boost their productivity and profitability. In particular, it outlines key areas that need to be addressed such as water sources, water quality, production requirements, pumps, filters, emitters, system hydraulics, energy, drainage and recycling management. Using this information, an action plan can be developed to identify any specific management and technological changes.

WATER SOURCES

Whether a site has a dam, uses bore water or utilises potable water for irrigation, growers should assess the quantity and quality of water from each source, as well as its limitations and costs. Good record keeping will also identify cost trends and storage demands over time.

Record keeping of bore performance, including sustainable long-term pumping rates and the seasonal variability of the standing water level, enables tracking of the variability of the water supply. Other information on depth, aquifers, casing size and screens should also be recorded.

NIASA recommends an audit to determine if drainage water should be collected, or disposed of, and identify the limiting factors in recycling and reusing this water. It's also important to understand how much water supply or pumping costs the business, and how secure these supplies are for the business.

WATER QUALITY

NIASA recommends testing the quality of irrigation and drainage sources. In particular, it urges growers to have full analytical tests done for pH levels, along with a range of other parameters such as Alkalinity and nutrients such as zinc, iron and sulphur.

Knowing the results of these tests is a key factor in assessing the suitability of the water for growing a successful crop. Knowledge of the irrigation water quality results in a decreased risk of irrigation equipment clogging and ensures disinfection systems are operating effectively.

PRODUCTION REQUIREMENTS

The NIASA manual also highlights how irrigation decisions, system design, crop types and management can affect optimal plant production. These can include:

- Irrigation times which match crop production requirements and minimise wind effects
- Plant disease susceptibility with wet foliage
- Staff working schedules (e.g. dispatch and spraying)
- Off peak power or water periods
- Excessive water use
- Excessive leaching of nutrients
- Uneven or slow plant growth
- Stage of plant life cycle
- Leaf drop, giving a less attractive product
- Poor inter-node spacing and plant shape
- Excessive drainage
- Elevated or contaminated water table

Source: Nursery & Garden Industry Australia (NGIA), *Nursery Industry Accreditation Scheme Australia (NIASA) Guidelines*. Updated 2016.



Building a new dam, Engall's Nursery, NSW.



Pohlmans Nursery, QLD.

IRRIGATION SYSTEM MAINTENANCE

It is easy to get caught up in the day-to-day; but if an irrigation maintenance plan is designed and implemented well, it will save time and money in the long-term. While some services may require a trained irrigation specialist, many tasks such as collecting data on sprinklers and pumps, can be actioned by the nursery.

While maintenance is a broad term, it can consist of simple tasks such as managing leaks and breakages, cleaning filters, pump inspections and service, as well as routines of flushing of pipes and disinfestation system inspections.

PUMPS

Pumps need regular checks to ensure they are working efficiently. Management of operating pressures at each irrigation

zone is important, as is making visual observations of, or listening to, operating equipment to identify any emerging faults.

Usually, your local irrigation equipment supplier can provide a pump curve for each pump, which allows the suitability of the pump to the range of expected pumping conditions (pump duties) to be determined. Good record keeping should detail:

- Shut off pressures on roto dynamic pumps to monitor impeller wear
- Suction losses to check efficiency of pumping systems
- The maintenance schedule for pumps and key components, and when the services were completed
- Detailed energy costs to run pumps for each season to determine efficiency of pumping systems.

FILTERS

Good filtration is critical to achieving trouble-free nursery irrigation. Filters require regular cleaning, with the interval being determined by the amount of matter in the water.

Regular visual checks should be made to review the condition of screens, discs and media.

Check with your irrigation specialist about the type and size of your filter units, as well as the capacity of the unit and how it suits the nursery's requirements.

Be sure to record the back flushing/cleaning frequency and understand what maintenance needs to be carried out.



Water treatment, collection and recycling at Cameron's Nursery, NSW.

DISINFESTATION AND FLUSHING OF LINES

Regular visual inspections can alert growers to many emerging problems and issues. It is best practice to regularly service injection pumps every six to twelve months, depending on the level of usage.

Flushing of main lines and laterals can reduce the foreign material build up in that can lead to possible blockages, breakages and reduced performance.

Sources: Hart & McMullin (2015). Rolfe, Ylasoumi, Keskul (2000). NGIA, NIASA Guidelines (2016).

IMPLICATIONS FOR THE NURSERY INDUSTRY

Evaluation and maintenance are a fundamental component of ensuring your nursery irrigation system has a long and successful life. Nurseries that develop and implement a plan to review their irrigation will see improved crop growth and increased efficiencies, especially in the long-term.

Whether it's visual observations, pressure or discharge measurements, the cleaning of filters, flushing of lateral pipes, or even chemical treatment, it is best practice to regularly revisit your irrigation system to ensure it is working efficiently and effectively.

SPRINKLERS AND DRIPPERS

Using catch cans, growers can measure and calculate the Mean Application Rate (MAR), Coefficient of Uniformity (CU) and Scheduling Coefficient (SC) for each irrigation block, noting the operating pressure, types of sprinklers/drippers and spacing.

The WaterWork workshop for water management in container nurseries delivers training on how to assess irrigation systems. These workshops provide a calculator and guide growers

on how to assess the performance of their irrigation systems. The calculator is available online via NGIA'S Water Management Toolbox (www.ngia.com.au/Section?Action=View&Section_id=557). A video on conducting a catch can test is also available on www.nurseryproductionfms.com.au.

Monitoring the performance of an irrigation system (pressure, output and uniformity) helps direct the maintenance schedule and identify problems before they affect crop growth.

LINKS TO RESOURCES

Rolfe, C., Ylasoumi, W, Keskula, E. (2000) *Managing water in plant nurseries: a guide to irrigation, drainage and water recycling in containerised plant nurseries*. NSW Agriculture.

Hart, S & McMullin, L. (2015) Ensuring the irrigation system operates efficiently in nursery production: <http://nurseryproductionfms.com.au/download/ensuring-the-irrigation-system-operates-efficiently-in-nursery-production/>

Nursery & Garden Industry Australia (NGIA), *Nursery Industry Accreditation Scheme Australia (NIASA) Guidelines*. Updated 2016: <http://nurseryproductionfms.com.au/niasa-accreditation/>

The Nursery FMS website contains a range of resources on water management in production nurseries including technical articles, videos and links: <http://nurseryproductionfms.com.au>

Water Management Toolbox: https://www.ngia.com.au/Section?Action=View&Section_id=557

PAST EDITIONS OF NURSERY PAPERS ARE AVAILABLE ONLINE on the Nursery & Garden Industry Australia website http://www.ngia.com.au/Section?Action=View&Section_id=46