

Conducting an Irrigation System Audit.

A survey of production nurseries that participated in WaterWork workshops found that information on average water use, water cost, pumping cost, maintenance cost, and hand watering labour cost was not known. A similar lack of data has also been found during the course of the RWUE project. The benefit of a system audit for production nurseries is that it identifies maintenance items that will reduce system downtime and will help to improve productivity and profitability. Conducting a system analysis demonstrates to regulatory authorities that a responsible approach is being taken to water management, and impacts to the environment are being minimised. As an industry, it is imperative that information gained from irrigation system audits is readily available, so that nurseries have continued access to water.

A full evaluation of the current irrigation system and irrigation management may require a qualified irrigation specialist, but much of the data on system performance can be collected by staff e.g. information on sprinkler performance.

When conducting an irrigation system audit, water supply is the first area to be investigated. Information on total availability, quality and quantity limitations, costs and backup supplies needs to be recorded. If bores are used as a water source, information on the sustainable long term pumping rate, seasonal variability in standing water level, depth of aquifers, casing size and screens used is required to determine the available water and pumping efficiency. The amount of drainage water and what collection and recycling options are available, along with the limiting factors for recycling or reusing water demonstrates the feasibility of water recycling. Water quality needs to be determined by a full laboratory analysis and, in addition to the full nutrient analysis, tests such as turbidity need to be done if ultra-violet disinfection is being used. Full nutrient tests will determine if there is a clogging hazard, and what disinfection limitations are imposed by water quality.

Information is then gathered on irrigation scheduling covering areas such as how scheduling is managed to minimise wind effects, reduce excessively wet foliage, minimise interference with staff working schedules, and to take advantage of off-peak power or water periods. A benefit of reviewing this information is that it can help to reduce excessive water use and nutrient leaching, which will improve uneven and/or slow plant growth, leaf drop, poor internode spacing and plant shape. This also provides information on how to reduce excessive drainage and minimise the impact on elevating and/or contaminating water tables. A record should be made of the current irrigation schedule for each block, the process used to determine irrigation run times, and any seasonal variations in scheduling.

Details of pumps, particularly pump curves, can be obtained from an irrigation specialist and the performance of the pump compared to the duties required. Recording shut off pressures and comparing these to pump curves indicates the amount of impeller wear and, from this, in conjunction with measuring suction losses, the efficiency of the pumping system can be calculated. An assessment of system hydraulics can then be made to enable comments to be made on the adequacy of pumps, pipes and valves, and changes that need to be made to optimise performance. Finally, a maintenance schedule for the pumping units can be developed.

Other areas that are included in a system audit are the type and size of filter units and suitability for the application, along with records of back-flushing frequency and maintenance done on the unit. Catchcan tests can be done to determine Mean Application Rate (MAR), Coefficient of Uniformity (CU), and Scheduling Coefficient (SC) and a record of operating pressures, types of sprinklers and spacing made. An outline of a system maintenance schedule and how the system is monitored can then be done e.g. pressure and output monitoring.

Finally, the drainage system is described detailing the types of drains used, and how well they cope with water in heavy rainfall, and demonstrate how drainage is managed to minimise downstream pollution. Information on how well the drainage system matches the slope, soils and rainfall intensity and if the system meets all regulations should also be recorded. In this assessment, it should be shown how the storage of water optimises water retention and minimises pollution in surface and groundwater systems, and that losses through seepage are minimised.

Auditing highlights the limitations and opportunities that are available for optimising water use efficiency through management and technological improvements. At the end of the process a prioritised action plan can be drawn up, and this then allows improvements to be costed and planned for.

For further information on conducting an irrigation system audit refer to The Nursery Papers May 2006 Issue no. 4.

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