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Testing irrigation water quality

Irrigation water quality is a critical factor for nursery container production. There are many factors which determine the quality of irrigation water, some of which include alkalinity, pH and the level of soluble salts.

Poor water quality can interfere with plant water and nutrient uptake that can lead to slow growth, leaf damage, leaf margin scorch, root injury and reduced plant health. Water quality should be regularly tested to ensure it is suitable for nursery container production.

The importance of water testing

Regular water testing is one of the simplest things that a production nursery can undertake to manage water quality. Water testing allows growers to identify problems and if necessary apply early corrective measures to rectify any identified issues. Water testing for pH and EC can easily be carried out on-farm and is highly recommended, however it is also important to have the irrigation water supply independently tested at regular intervals to ensure a complete water analysis identifies any seasonal, emerging or broader issues. Testing laboratories conduct full analysis of the quality of irrigation water samples for less than one hundred dollars and when contacted can provide details of sample collection requirements.

Alkalinity and pH

Alkalinity and pH are two important factors affecting the suitability of water for production nursery irrigation. Irrigation water ideally should have a pH of between 5.5 and 7.0 and can influence the success or failure of a crop. Irrigation water that is maintained between these parameters will maintain the nutrient balance, prevent scale formation in irrigation equipment and provide effective chemical disinfestation. pH is a measure of the hydrogen ions in solution. The pH scale is logarithmic with a change of one pH unit meaning a tenfold change in the concentration of hydrogen ions. Hydrogen ions play a part in most of the chemical reactions in water and soil and their concentration influences the solubility of fertilisers and the availability of nutrients. A pH that is too high can result in nutrient deficiencies and a pH that is too low may result in micronutrient toxicities and injury to the root system. pH is also extremely important when disinfesting water for irrigation using oxidising agents. Effective chlorine disinfestation of irrigation water for example, is dependent on the pH level of the water to be treated being below pH7.5 or acidification of the water prior to chlorine injection will be required to alter the pH value. pH testing is a simple on-farm test that can be easily conducted with suitable equipment.

Alkalinity is a measure of bicarbonates, carbonates, and hydroxides in irrigation water. High alkalinity has a significant effect on growing media fertiliser availability and on plant

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nutrition. Test results for alkalinity are generally expressed in milligrams per litre (mg/l). Increasing levels of Calcium Carbonate may cause the pH to rise to unacceptable levels particularly in longer term crops and high bicarbonate levels may lead to increasing problems with plant growth and foliage staining. Laboratory analysis of irrigation water should always include testing for both pH and alkalinity. Water with high levels of bicarbonates or carbonates, can have a pH value of 7 or above, but water with high pH does not always equate to high alkalinity. Alkalinity testing is conducted by accredited water testing laboratories.

Electrical conductivity

Soluble salts in water (also referred to as salinity) can be measured by electrical conductivity (EC). EC units are quoted in microSiemens per centimetre (µS/cm) or in deciSiemens per metre (dS/m). 1,000 µS/cm is equal to 1 dS/m. EC measures the natural salinity levels as well as the salinity derived from fertiliser applications.

High EC values can sometimes be found in underground water supplies from bores and wells and elevated EC values can be found in recycled irrigation water from fertiliser residues. Plants vary in their sensitivity to salinity. Excess soluble salts can damage plant roots leading to reduced water and nutrient uptake. Irrigation water with fluctuating levels of electrical conductivity can be managed with regular monitoring allowing prompt remedial action to be taken. If the electrical conductivity of irrigation water rises to unacceptable levels, it may be necessary to blend the high salinity water with another water source of better quality to reduce the overall EC. EC is a simple test that with the right equipment can easily and quickly be conducted regularly on-farm.

Regular testing and monitoring of irrigation water quality in nursery production provides the opportunity to address any emerging issues before they escalate to become even greater problems. Changes to the growing system, growing media, or fertiliser type or application can have a significant effect on the water quality of wastewater collected for recycling. Regular testing provides information on how these changes affect the quality of your irrigation water, and decisions can be made on appropriate corrective measures. Monitoring the quality of irrigation and drainage water in recycling systems over time is critical, as drainage water quality has a major influence on the quality of irrigation water and plant production.

Testing and monitoring of wastewater can also provide valuable information on the quality of any release water or water that leaves the nursery property during a rain or storm event. These monitoring records provide evidence of the quality of water flowing back into the environment. This can be useful information in demonstrating the quality of water leaving the property if there is an issue downstream of the nursery.

More information on water quality for nursery container production irrigation can be found in the publication ‘Managing water in plant nurseries’.

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