



UNIVERSITY of NEW HAMPSHIRE COOPERATIVE EXTENSION

Irrigation Water Quality

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Water is an important resource for every type of cultivation. It must not only be available but must also be of sufficient quality. One can use rainwater, well water, surface water (pond or river) or town or city water. Water quality plays a crucial role in successful production of ornamental crops, determining which crops can be grown and how irrigation and fertilization must be managed. A thorough water analysis and evaluation is therefore important for any ornamental plant production operation. Many plants respond satisfactorily to irrigation waters of relatively wide ranging chemical composition. However there are plants that are particularly sensitive to specific water quality parameters. The following water properties are of greatest concern in ornamental plant production.

Total Soluble Salt

This is also referred to as total dissolved solids (TDS). The total concentration of salts dissolved in water (salinity) directly affects plant growth by either a specific ion toxicity or as a general salinity effect by reducing the availability of water to the plant. Sometimes plant growth reduction caused by salinity is so subtle and may go unnoticed by growers. However, several ornamental plants are adversely affected by mild salinity.

The most practical way to measure salinity is by electrical conductivity (EC). The ability of water to conduct an electrical current is directly related to the concentration of salts present in the solution. The higher the EC, the higher the salt content and the less the water is desirable for plant growth. Water with an EC greater than 1.0 mmhos/cm or 1.0 mS/cm would be considered to have a high salinity hazard.

If your source of water has an EC greater than 1.0 mmhos/cm or 1.0 mS/cm action must be taken to reduce the salinity. Switch to a new source of water if available to one with lower amounts of dissolved salts. Many growers blend water from two sources (one with high salinity and one with low salinity) to obtain proper salinity. A last resort would be the use of reverse osmosis, this is an expensive but effective method.

pH and Alkalinity

These two are important factors in determining the solubility of water for irrigating ornamental plants. pH is a measure of the concentrations of hydrogen ion (H^+) in water or other liquids. pH is an important chemical property related to plant growth because of its effect on nutrient availability. It is therefore important to monitor and control pH during the growth of your crop. Water for irrigation should have a pH between 5.0 and 7.0. However, it is the relationship between water pH and alkalinity, namely the presence of high alkalinity that will have a more significant impact on pH control of soils and growing media. Alkalinity is a

measure of the water's ability to neutralize acidity. An alkalinity test measures the level of bicarbonates, carbonates and hydroxides in water. The results are expressed as ppm of calcium carbonate (CaCO_3). Levels between 30 and 60 ppm are considered optimum for most plants.

When water having both high pH and high alkalinity is used for irrigation over time, it will significantly elevate the growing media pH to undesirable levels causing reductions in plant growth and quality. Trace elements deficiencies and imbalances of calcium (Ca) and magnesium (Mg) can result from irrigating with high alkalinity water. The problem is more serious when plants are grown in small containers because small volumes of growing media are poorly buffered to pH change. Carbonates and bicarbonates in high alkalinity water can also clog nozzles of sprayers and drip irrigation systems. These salts will also form unsightly precipitates on leaves. The activity of some pesticides and growth regulators is reduced by high alkalinity.

When the alkalinity of the water is only marginally high the use of an acidic fertilizer can be used to remedy the problem. High alkalinity waters may require acid injection as a proper solution. Common acids used are sulfuric, nitric, phosphoric and citric acids. Use caution when using nitric or phosphoric acids as they will increase the amount of nitrogen or phosphorus, respectively, to your irrigation water and your fertilizer practices may need to be adjusted. Sulfuric acid is the most common acid used due to its effectiveness without the need to change fertilization, and cost.

Water Testing

A reliable assessment of water quality is important. The quality of assessment depends on water sampling and how the sample is handled. For results to be valuable, the sample must represent the water in use or considered for use. Samples should be taken as close as possible to the well or the main pump and only after the upstream piping has been purged of standing water. Avoid glass and metal containers as they may contaminate the water with elements like boron or iron. Ship the sample as soon as possible after collection to the laboratory. It is recommended to test the water two times a year. You can test the alkalinity yourself by purchasing an alkalinity test kit, and pH and EC by purchasing a pH and EC meter. However, the laboratory test is more reliable.