



Nursery & Garden Industry  
Queensland

# pH and electrical conductivity meters

*pH and electrical conductivity (EC) meters are essential pieces of equipment for onsite testing of water and growing media. Onsite testing allows immediate decisions to be made on the nutritional status of crops, as well as being able to monitor changes in water quality.*

With a little bit of training, and a basic understanding of how these pieces of equipment work, anyone can use these indispensable nursery tools.

## How meters work

pH meters determine pH by selectively measuring the concentration of hydrogen ions in the material being measured. pH gives a broad indication of the suitability of a growing media or water source for its intended use, and this can be useful in determining the likelihood of nutritional deficiencies developing, or predicting how well a crop will grow, and the effectiveness of water treatments being applied.

An EC meter measures the concentration of salts in the solution of the sample being tested, by passing an electrical current through the solution. The



**Bench meter**

ability of the solution to conduct electricity increases in direct proportion to the increase in salt content, allowing the salt concentration to be measured. Salts are of interest in growing plants in production nurseries, because they can be a broad indicator of the amount of fertiliser in a growing media, or a measure of the quality of the water being used for irrigation.

## Types of meters

There are many types of meter available, from pocket meters which measure only one parameter e.g. pH, to bench meters capable of measuring multiple parameters to a high degree of accuracy e.g.



**Pocket meter**

pH, EC, salinity and temperature. Price shouldn't be the only determining factor in deciding which unit to purchase, as it might be better to spend more on a unit which gives accurate and reliable results.

EC meters vary in the ranges they measure, so it is important to have an idea of the range of ECs likely to be encountered during testing. Ranges up to 5.0 dS/m would cover most situations encountered in nursery production. The measurement of pH is dependent on the temperature of the solution, and automatic temperature compensation is a feature that allows the unit to take into account the effect of different temperatures on the reading obtained. The accuracy and resolution (the number of decimal places measured to) also varies between



units and, apart from cost and reliability, are the two main differences between meters. To maximise battery life, look for meters that have an automatic shut off after they haven't been used for a period of time, and it is advisable to always have a set of fresh batteries available.

### **Calibration and maintenance**

Calibration of meters is necessary to provide accurate results. pH meters require at least a 2 point calibration to maintain accuracy, with pH buffers of 7.0 and 4.0 bracketing the most common pH's encountered in nursery water and growing media. EC meters only require a single standard solution for calibration.

Many modern day meters have relatively simple calibration procedures, and it is critical to use fresh solutions when calibrating meters to ensure the calibration is accurate. Buffers and standards should be stored in cool conditions to ensure they remain useable, and they should never be reused.

Probes do not last forever. The length of service provided by a probe is related to the design and maintenance of the probe, and the types of solutions they are used in, e.g. samples with more suspended matter will shorten the life of pH probes.

Probes should be stored according to the manufacturers recommendations, with pH probes needing to be kept moist, and EC probes allowed to dry out. Probes should never be stored in distilled water, as this will reduce their serviceable life. Special care must be taken to ensure the probes are not damaged during use by scratching or chipping.

As with all measurement equipment, sometimes strange results occur, and in these cases it can be beneficial to have a second method of measuring the pH and EC to confirm the results.

*Lex McMullin*  
*Farm Management Systems Officer*  
*Nursery & Garden Industry Queensland*

*Published December 2013*