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An Inexpensive, Pocket-size Meter for Measuring Growing Media pH

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The pH of a plant growing medium is a major determinant of nutrient availability and plant growth (1), so monitoring the pH of growing media is an important management practice. The pH of growing media can be measured colorimetrically with test papers or indicator solutions (2, 4) or potentiometrically with a glass electrode pH meter (1, 2, 6). Colorblind people, estimated to be 10% of the male population, cannot use colorimetric methods (3).

There are numerous models of glass electrode pH meters with prices starting about $150. Recently, an inexpensive ($32.50) pH meter was introduced. The PHH-1 pH meter (Omega Engineering, One Omega Drive, Box 4047, Stamford, CT 06907) weighs 63g, is 144 × 28 × 15 mm, and is powered by four batteries with a 1000-hr life. The unit has a digital, liquid crystal display (LCD), a 0 to 14 pH range, a listed accuracy of ± 0.2 pH units, and a 0.1 pH unit resolution. The meter has a sealed gel-filled combination electrode built into the base of the unit and is designed to be disposable. When the KCl in the electrode is exhausted, the unit should be replaced. The suitability of the PHH-1 for measuring growing media pH was evaluated.

To test the pH meter, the plastic cap covering the base of the meter was removed and the electrode submerged ≈2 cm into a pH 7 buffer. The meter was turned on and the LCD adjusted to pH 7 by turning the offset trimmer, a recessed screw in the back of the instrument. A small "screwdriver" to adjust the offset trimmer was fashioned by trimming the end of a plastic pot label with scissors. After rinsing the electrode with deionized water, the meter then was placed in a pH 4 buffer, and the LCD alternated between 4.1 and 4.2 The meter was not adjusted to pH 4.0 because it lacks slope correction; however, the reading was still within the stated accuracy of ± 0.2 pH units. When placed in a pH 10 buffer, the LCD read 10.0.

The PHH-1 then was compared with a research pH meter (Orion SA-720, with automatic temperature compensation and slope adjustment). The pH of saturated growing media was measured by both meters (Table 1). The PHH-1 was recalibrated before each of five replicate measurements of the six growing media. The pH 7 buffer was used for calibration. The SA-720 was calibrated with both pH 4 and pH 7 buffers. The resolution of the SA-720 was set at 0.1 unit. To cover the range of media pH typically encountered, 0 to 6 g·liter^{-1} of $CaCO_3$ was added to sphagnum peat prior to a 30-day moist incubation. The agreement between the 2 meters was within the stated accuracy of the PHH-1 of ± 0.2 unit (Table 1). The SDs of the PHH-1 were equal to or less than those of the SA-720.

The life of the PHH-1 is not known. Meter longevity will probably depend on the number of samples measured. The major reason why the electrode wears out is the exhaustion of the KCl. For pH measurement, KCl must leak from the electrode through a small porous disk in the base of the instrument. Storing the meter upside down when not in use slows the loss of KCl, but this has not been confirmed to extend meter life. Some exhausted, gel-filled pH electrodes can be temporarily revived by placing them in saturated KCl at 50°C and allowing the solution to cool (5). This treatment often forces KCl into the electrode and extends its life.

Because of its low price, ease of use, and portability, the PHH-1 seems ideal for teaching and extension use as well as for routine monitoring of growing media pH in commercial crop production.

Literature Cited

1. Bunt, A.C. 1976. Modern potting composts. Penn State Univ. Press, University Park.
2. Chapman, H.D. and P.F. Pratt. 1961. Methods of analysis for soils, plants and waters. Division of Agr. Sciences, Univ. of California, Berkeley. Publ. 4034.
3. Handreck, K.A. and N.D. Black. 1984. Growing media for ornamental plants and turf. New South Wales Univ. Press, Kensington, NSW, Australia.
4. Hipp, B.W., C. Giordano and N. O'Connor. 1985. A simple and inexpensive method of estimating media pH. HortScience 20:951–952.
5. Omega Engineering. 1987. Measurement of pH. Complete pH and conductivity handbook and encyclopedia. Omega Engineering, Stamford, Conn. p. A-5 to A-8.
6. Westcott, C.C. 1978. pH measurements. Academic, New York.

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Table 1. The pH of saturated growing media as measured with two pH meters, Omega PHH-1 and Orion SA-720.

Growing medium	$CaCO_3$ (g·liter^{-1})	Medium pH[z]	
		PHH-1	SA-720
Sphagnum peat	0	3.46 ± 0.055	3.54 ± 0.055
Sphagnum peat	1.5	4.38 ± 0.045	4.58 ± 0.045
Sphagnum peat	3.0	5.58 ± 0.045	5.56 ± 0.114
Sphagnum peat	4.5	6.86 ± 0.055	6.76 ± 0.089
Sphagnum peat	6.0	7.10 ± 0.0	7.02 ± 0.084
Pro-Mix	0	6.40 ± 0.0	6.46 ± 0.055

[z]Mean ± SD, n = 5.