NOTES

HortScience 23(3):625. 1988.

Measuring Growing Media pH with Metal-probe and Glass Electrode pH Meters

David R. Hershey[1]
Department of Horticulture, University of Maryland, College Park, MD 20742.

Additional index words. soil testing, mineral nutrition, instrumentation

Probe pH meters are marketed by many horticultural suppliers and cost from $5 to $21. A probe pH meter consists of an analog meter attached to one or two metal probes. To measure pH a probe is pushed into moist growing medium, and the indicator needle points to the pH. Despite low cost and seemingly simple operation, probe pH meters have been criticized as being unsuitable for horticultural use (1, 3). I, therefore, evaluated the accuracy of a probe pH meter for measuring growing media pH.

Two "pH Computer" probe pH meters were purchased from two horticultural suppliers. The pH Computer has two 90-mm metal probes, a pH range of 3 to 10, and costs $21 (Environmental Concepts, Fort Lauderdale, Fla.). The probe pH meters were compared with a research-grade, glass electrode pH meter (Orion 720) to measure pH of sphagnum peat moss, previously incubated for 8 weeks with 0 to 6 g $CaCO_3$/liter and pH buffer solutions of pH 4.0, 7.0, and 10.0. Saturated medium samples or buffer solutions were placed in 25 × 100 mm plastic test tubes into which the probes were inserted to their full depth. There were five measurements for each medium or buffer sample for each one of the meters. Manufacturer's directions were followed for each instrument. The Orion 720 was calibrated using a two-point standardization with pH 4.0 and 7.0 buffers. The pH Computer was not designed to be standardized. Before each measurement the pH Computer probes were wet with deionized water and polished briskly with the paper toweling that came with the unit. Since directions were not specific, the probes were "polished briskly" by rubbing them five times from base to tip. The probes were then inserted in the sample to their full depth, and the pH reading made 1 min after insertion.

The probe pH meter readings generally did not agree closely with the glass electrode meter readings (Table 1), but gave similar readings to each other. The probe meters overestimated pH of unlimed sphagnum peat moss by 1.2 or 1.8 pH units, making them too inaccurate for horticultural use. Measurement of the pH buffer solutions with the probe meters was less accurate than measuring the medium (Table 1). Probe pH meters supposedly work by monitoring "slight variations in the electrical current arising from changes in the acid content of the soil" (Personal communication, AMI Medical Electronics, Ronkonkoma, N.Y.). However, pH is not a measure of electrical current but of hydrogen ion activity; this may explain the low accuracy of the probe meter pH readings.

This research supports the opinions (1, 3) that probe pH meters are unsuitable for horticultural use. Interestingly, the pH Computer directions state that it was "tested for accuracy at a State Dept. of Agriculture Station", but does not state the degree of accuracy found. Because probe pH meters appear to be too inaccurate, the least expensive pH meter suitable for horticultural use is the pocket-size, digital type (2) costing about $32.

Literature Cited

1. Handreck, K.A. and N.D. Black. 1984. Growing media for ornamental plants and turf. New South Wales Univ. Press, Kensington NSW, Australia.
2. Hershey, D.R. 1988. An inexpensive, pocket-size meter for measuring media pH. HortScience 23:404.
3. Swain, R.B. 1985. The basics of soil acidity. Horticulture 63(5):10–12.

Table 1. pH values of sphagnum peat moss and buffer solutions measured with a pH Computer probe pH meter and an Orion glass electrode pH meter.

Sample[z]	$CaCO_3$ (g/liter)	Sample pH[y]		
		Orion	pH Computer A	pH Computer B
SPM	0	3.6 ± 0.07	4.8 ± 0.20	5.4 ± 0.21
SPM	1.5	4.5 ± 0.04	5.0 ± 0.09	5.2 ± 0.15
SPM	3.0	5.6 ± 0.08	6.6 ± 0.24	6.7 ± 0.11
SPM	4.5	6.3 ± 0.11	6.5 ± 0.27	6.8 ± 0.09
SPM	6.0	6.7 ± 0.13	6.9 ± 0.15	6.9 ± 0.04
pH 4 buffer	0	4.0[x]	---[w]	---[w]
pH 7 buffer	0	7.0[x]	8.8 ± 1.30	5.5 ± 0.27
pH 10 buffer	0	10.1 ± 0.0	8.5 ± 0.38	8.1 ± 0.25

[z] SPM = sphagnum peat.
[y] Mean ± SD, n = 5.
[x] Used to standardize meter.
[w] Four of five measurements off-scale, >10.

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[1]Assistant Professor.