



reference

Soil Salinity Reference



GCSAA

Golf Course Superintendents Association of America

SOIL REFERENCE

Monitoring soil salinity

Field Scout EC probe and meter



Protocol for in-office EC measurements (most accurate method):

- 1) Obtain a representative soil sample, about 50cc (about 2 oz) in a small cup.
- 2) Add your irrigation water while stirring until the soil surface glistens. Don't add too much water. If the water can be poured off, you've added too much and you will need to start over or add dry soil.
- 3) Stick the probe into the soil so the electrodes are completely immersed in the soil.
- 4) Read the meter and convert the meter reading using Table 1 below. Record the converted value for future reference.

Protocol for in-field EC measurements:

- 1) Saturate the area of the green to be evaluated with irrigation water. The soil must be saturated to obtain an accurate reading.
- 2) Stick the probe into the soil so the electrodes are completely immersed in the soil.
- 3) Read the meter and convert the meter reading using Table 1 below. Record the converted value for future reference.

Table 1. Conversion table for determining the saturated soil extract EC (Extract EC) from the direct soil reading with your salinity meter (Meter). All values are in mS/cm =dS/m= mmhos/cm. To convert your meter reading to the correct EC reading, use the following equation:

$$\text{EC (mS/cm)} = (\text{meter reading} \times 2.7) + 0.8$$

Meter	Extract EC	Meter	Extract EC	Meter	Extract EC
0.1	1.1	1.1	3.8	2.1	6.5
0.2	1.3	1.2	4.0	2.2	6.7
0.3	1.6	1.3	4.3	2.3	7.0
0.4	1.9	1.4	4.6	2.4	7.3
0.5	2.2	1.5	4.9	2.5	7.6
0.6	2.4	1.6	5.1	2.6	7.8
0.7	2.7	1.7	5.4	2.7	8.1
0.8	3.0	1.8	5.7	2.8	8.4
0.9	3.2	1.9	5.9	2.9	8.6
1.0	3.5	2.0	6.2	3.0	8.9

Table 2. Relative tolerance of turfgrasses to soil salinity (Harivandi et. al. 1992).

Sensitive < 3 mS/cm	Moderately Sensitive 3-6 mS/cm	Moderately Tolerant 6-10 mS/cm	Tolerant > 10 mS/cm
Annual bluegrass	Annual ryegrass	Bent. cv. Seaside	Alkaligrass
Colonial bentgrass	Chewings fescue	Perennial ryegrass	Bermudagrass
Kentucky bluegrass	Creeping bentgrass	Tall fescue	Seashore paspalum
Rough bluegrass	Hard fescue	Buffalograss	St. Augustinegrass
Centipedegrass	Bahiagrass	Zoysiagrass	

Reference:

Harivandi, M.A., Butler, J.D. and Wu, L. 1992. Salinity and turfgrass culture. Pages 207-229 in Turfgrass (Waddington, D.V., Carrow, R.N. and Shearman, R.C. eds) Series No. 32. American Society of Agronomy, Madison, WI.

Measurements taken directly from soils in the field are more variable because they are dependent upon soil moisture conditions. However, the direct field readings will provide a quick and easy estimate of soil solution EC which will allow you to determine when salts are building up and leaching is needed. For example, when the meter reading exceeds 0.7 mS/cm (dS/m) for soil under annual bluegrass turf, the extract EC is approaching 3.0 dS/m, the upper limit for healthy poa growth and development (Table 2). In this example, leaching will be needed to prevent further increase in EC and resultant plant stress.

Calibration: The meter should be calibrated once per week or before use if the meter has stored for more than a week. To calibrate, pour a small volume of the calibration solution listed below into a small container. Submerge the meter electrodes completely into the calibration solution. Adjust the meter reading according to manufacturer's instructions, until the meter reads 2.76 mS/cm.

Supplies:

- Field Scout soil EC probe and meter (catalogue # 2265FS) from Spectrum Technologies, 800-248-8873 or www.specmeters.com. About \$350.
- Calibration solution 2.76 mS/cm (catalogue # 2254 from Spectrum Technologies, , 800-248-8873 or www.specmeters.com). About \$13.00

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Weekly Electrical Conductivity Weekly Record Sheet

Year: _____

Meter used: _____

Location (e.g., G18, F1, R3)														
	Meter	ECe	Meter	ECe	Meter	ECe	Meter	ECe	Meter	ECe	Meter	ECe	Meter	ECe
Jan 1														
2														
3														
4														
Feb 1														
2														
3														
4														
Mar 1														
2														
3														
4														
Apr 1														
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May 1														
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Nov 1														
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3														
4														
Dec 1														
2														
3														
4														

To convert meter readings to ECe values in dS/m, see reverse side of sheet