

KNOW WHEN TO OVER-IRRIGATE

An easy way to monitor soil salinity.

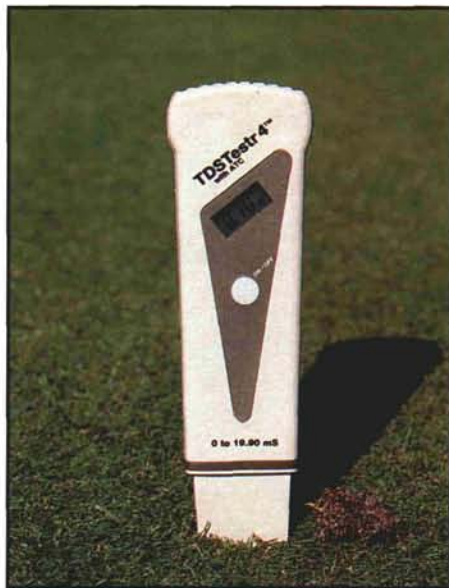
by PAUL H. VERMEULEN

AS POPULATION CENTERS continue to expand in all areas of the country, the demand for fresh water supplies is becoming greater and greater. To help ease this growing demand, many golf courses are electing to use alternative irrigation supplies. The two principal alternatives are: 1) poor-quality groundwater and 2) reclaimed water from a nearby sewage treatment facility.

Because alternative irrigation supplies generally contain high concentrations of soluble salts, periodic over-irrigation or leaching is required to prevent excess salts from accumulating in the root zone. Without over-irrigation, the accumulation of salt will increase the osmotic potential of the soil solution, and, in turn, decrease water and nutrient availability to the roots.¹ Typical symptoms of salt accumulation reported by golf course superintendents include premature wilting, reduced clipping harvest, and poor fertilizer response.

There is a wide tolerance range among the different turfgrass species to alternative saline irrigation supplies. While some species, such as Seashore paspalum and alkaligrass, are very tolerant, others, such as *Poa annua* and Kentucky bluegrass, are very sensitive.² The physical characteristics of the soil also can be important. Poorly drained soil is more apt to accumulate salts than well-drained soil. No matter what the turf/soil combination, though, the key to using a saline irrigation supply is to over-irrigate before the salt accumulation reaches the lethal limit.

Salt accumulation has to be monitored to determine when over-irrigation is necessary. The most common monitoring method used by superintendents is to submit soil samples for laboratory analysis. While this method is popular, the lag time in receiving the results and the inconvenience of sample collection are serious drawbacks. Instead, many superintendents tend to look for turf-



New, low-cost meters are available to help superintendents better manage their courses. The TDSTestr 4™ meter measures salt accumulation in the root zone from saline irrigation supplies and lets superintendents know when over-irrigation is required to prevent turf damage.

grass symptoms rather than rely on accurate test data to determine the need for over-irrigation.

With the recent development of low-cost, portable meters that gauge salt accumulation by measuring electrical conductance (EC), soil salinity now can be easily monitored on a daily basis. These meters give superintendents the means to track salt accumulation more precisely and make informed irrigation decisions before turfgrass symptoms develop. A portable meter that has received good reviews in the Green Section's Western Region is the TDSTestr 4J sold by Cole-Palmer Instruments (1-800-323-4340, Cat. No. H-19800-30).

To convert the TDSTestr 4J readings from mS/cm into equivalent soil extract values in dS/m (1 dS/m = 1 mmhos/cm), Dr. Larry Stowell of the PACE Turfgrass Research Institute

published the following correlation equation ($R = 0.94$, $P < 0.0001$):

$$\text{Saturated soil extract EC (dS/m)} = 0.8 + 2.7[\text{TDSTestr 4J EC (mS/cm)}]^2$$

This correlation equation was developed by comparing the results from soil extracts using a Horiba EC meter with direct immersion of the TDSTestr 4J in soil samples. Depending on meter calibration and protocol, the correlation equation may require a slight adjustment for each individual.

A simple protocol for monitoring salt accumulation in the root zone of a green using the TDSTestr 4J is:

1. Saturate, but do not over-irrigate the test area using the irrigation system or a watering can.

2. Remove a shallow plug of thatch from the surface of the green with a soil probe or similar implement.

3. Insert the TDSTestr 4J meter into the saturated soil so that the electrodes are completely immersed.

4. Record meter reading.

When used consistently, the results of monitoring the accumulation of salt will indicate when over-irrigation is necessary to maintain high-quality turf conditions.

¹Beard, J. B. 1973. *Turfgrass: Science and Culture*. Prentice Hall, Inc., Englewood, NJ.

²Harivandi, M.A., J. D. Butler, and L. Wu. 1992. *Salinity and Turfgrass Culture*. Turfgrass Series No. 32, pp. 207-229. American Society of Agronomy, Madison, WI.

³Stowell, L. J. and S. Davis. 1993. *Direct Measurement of Electrical Conductivity in Golf Course High-Sand-Content Soils*. *Phytopathology* 83:6:693.

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