Teresa Carson

Photo courtesy of SpectrumTechnologies Inc.

Seeing is believing?

QUESTION: I would like to be able to monitor my turf quality as easily and as objectively as possible on a regular basis so that I can make the best decisions on nutritional and cultural practices. Are any tools available to help me confirm and quantify my observations?

ANSWER: Traditionally, turfgrass quality is evaluated visually by a trained professional who rates the turf on a scale of 1 to 9, where 1 is the worst rating (the grass is dead) and 9 is the best (the grass is of outstanding quality). Although nothing beats the eye of a trained superintendent, the greatest variable in evaluating turfgrass quality is still the human factor. Individual biases are inevitable and lead to some level of inconsistency, even among the most highly trained observers. The natural limitations of the human brain in distinguishing among closely related objects can also affect visual evaluations.

In the course of their research, Wendy Gelernter, Ph.D., and Larry Stowell, Ph.D., of PACE Turfgrass Research Institute found that other scientists have explored human limitations in objectively assessing color (http://persci.mit.edu/gaz/ and http://web.mit.edu/persci/). Gelernter says, "A patch of turf can look either bad or good, depending on the quality and color of nearby turf. If the nearby turf is dark and beautiful, we perceive that our turf looks bad; if the nearby turf is light colored and patchy, then the reverse is true. This is a perception problem that is hard-wired in our brains — no amount of training can reverse it."

If human evaluations are imperfect, are there other ways to evaluate turf quality? For several years, chlorophyll meters have been used to evaluate chlorophyll and leaf nitrogen and iron content in agricultural crops such as corn, sorghum, rice and wheat. These readings have allowed farmers to avoid overfertilizing and contaminating the environment while improving crop quality and saving money. It would seem that superintendents could reasonably expect to reap the same sorts of benefits.

Gelernter and Stowell have used a chlorophyll meter, the Field Scout CM1000 from Spectrum Technologies (www.specmeters.com/Chlorophyll_Meters/index.html), to assess turfgrass quality and have found that the meter's readings correlated significantly with visual turfgrass ratings. Conceivably, superintendents could use the meter to evaluate turf quality or to present objective confirmation of their own visual evaluations.

The chlorophyll meter used by Gelernter and Stowell can give chlorophyll readings for areas ranging from the size of a single leaf (0.434 inches or 1.10 centimeters in diameter) to a section of turf canopy (7.4 inches or 18.8 centimeters in diameter). The meter measures light at two wavelengths, 840 and 700 nanometers. Because chlorophyll *a* absorbs light with a wavelength of 700 nanometers, the reflection of that wavelength from the leaf or canopy will be reduced compared to the reflection of light with an 840-nanometer wavelength.

The "point and shoot" meter displays a digital readout of a chlorophyll index value that indicates the intensity of the turf color — the higher the number, the more intense the color. Turfgrass varieties that are naturally greener and darker in color will have higher ratings than varieties with a naturally lighter color, and denser stands of turf will have higher readings than thinner stands. Gelernter and Stowell have found that the method is more effective on monostands of turf than in areas where a number of varieties or species are present.

Although the researchers do not advocate abandoning traditional turfgrass evaulation techniques, they do believe superintendents can benefit from using a chlorophyll meter. "The meter can provide good supplementary information and it can serve as a double-check against more subjective visual observations. This is definitely a tool that can be useful to superintendents," says Gelernter.

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