

Protocol for the GCSAA/USGA Wetting Agent Evaluation

April 10, 2003

Goal

The goal of the wetting agent evaluation is to provide golf course superintendents with unbiased information regarding selected wetting agents so they can make informed use and purchasing decisions.

Objective

The overall objective is to determine the effectiveness of several wetting agents to control localized dry spots (LDS) on putting greens. Specific objectives are:

- determine the impact of wetting agent applications on turf color
- determine the impact of wetting agent applications on turf quality
- determine phytotoxicity damage to turf following wetting agent applications
- determine degree of soil hydrophobicity following wetting agent applications
- determine dew and frost formation following wetting agent applications
- determine pest damage following wetting agent applications

Timeline

- November 1, 2002 - information on the wetting agent evaluation mailed to turfgrass scientists
- December 20, 2002 – site profile form and soil test results due at GCSAA Headquarters from scientists interested in conducting the evaluation
- Mid-January 2003 – Advisory Panel will review site profile forms submitted and select sites to conduct the evaluation
- Late January 2003 – Scientists will be notified of the outcomes of the site selection process
- February 14, 2003 – An orientation meeting will be held in Atlanta, GA at the GCSAA Conference and Show to discuss the wetting agent profile
- March 2003 – wetting agents shipped to cooperators
- 2003 and 2004 – conduct wetting agent evaluation
- 2005 – publish results of wetting agent evaluation

Materials and Methods

Sites

The evaluation will be conducted at nine sites in the following regions of the country with the grass species listed:

- 1) Southwest – creeping bentgrass putting green - New Mexico State University
- 2) Southwest – creeping bentgrass putting green – Cal State Polytechnic-Pomona
- 3) Southwest – bermudagrass putting green – Texas A&M University

- 4) Southeast – creeping bentgrass putting green – University of Georgia
- 5) Southeast – bermudagrass putting green – University of Florida- Ft. Lauderdale
- 6) Transition zone – creeping bentgrass putting green – University of Missouri
- 7) Northeast – creeping bentgrass putting green – Cornell University
- 8) North central – creeping bentgrass putting green - Michigan State University
- 9) Northwest – creeping bentgrass putting green – Washington State University - Puyallup

Products

The wetting agents to be evaluated are listed by trade name with the manufacturer/distributor given in parenthesis; LESCOFlo (LESCO), Primer Select (Aquatrols), Aqueduct (Aquatrols), Cascade Plus (Precision Labs), Tri-Cure (Mitchell Products), Naiad (Naiad), Brilliance (Simplot Partners), Surfside 37 (Montco/Surfside), Respond 2 (Verdicon) and Hydro-Wet (KALO).

In addition, an untreated control will be included in the evaluation.

All products will be applied at the highest label rate for control/management of localized dry spots.

The wetting agents will be identified only by a code during the evaluation.

Duration of the evaluation

The wetting agent evaluation will be conducted over a four-month period of time when stress from LDS is at its peak. Each cooperator will determine the four-month period of peak stress from LDS at their location and conduct the evaluation during this time period. The wetting agent evaluation should not be conducted during the establishment period of overseeded grasses or the transition period back to bermudagrass on winter overseeded greens. It is likely that the months of the year the evaluation is in progress will vary depending on location.

Data to be collected

The following data must be collected at the intervals and using the rating scales given below.

Turf color – ratings taken every two weeks beginning 7 days after the initial application of the first wetting agent treatment. The rating scale is 1 to 9 with 1 = brown, 5 = medium green and 9 = dark green.

Turf quality – ratings taken every two weeks beginning 7 days after initial application of the first wetting agent treatment. The rating scale is 1 to 9 with 1 = poor quality, 5 = acceptable quality and 9 = excellent quality.

Phytotoxicity – ratings taken 1, 3 and 7 days after each application of a wetting agent. All plots should be rated each time phytotoxicity ratings are taken. The rating scale is 1 to 9 with 1 = brown or discolored turf, 7 = acceptable damage and 9 = green turf, no damage.

Degree of soil hydrophobicity – the water droplet penetration test will be used to determine soil hydrophobicity. The size of the water droplet should be 36 microliters. Use distilled, de-ionized water for the water droplet penetration test. Soil core size will be 1.9 cm ($\frac{3}{4}$ inch) diameter taken to a depth of 6 cm. The water droplet penetration test will be conducted at 0.5, 1.5, 2.5, 3.5, 4.5, and 5.5 cm below the soil surface. The maximum time for water droplet penetration is 600 seconds. Any water droplet remaining after 600 seconds should be recorded as 600 seconds. Three to five soil cores should be taken per plot. Cooperators with smaller plots should take three soil cores per plot and cooperators with larger plots should take five soil cores per plot. Water droplet penetration times from all cores from a single plot will be averaged by depth and the average water droplet penetration time by depth will be used to characterize that plot.

Sampling frequency will be:

- 1) within five days prior to initial application of the first wetting agent treatment
- 2) 2 weeks after the initial application of the first treatment
- 3) 4 weeks after the initial application of the first treatment
- 4) 8 weeks after the initial application of the first treatment
- 5) 12 weeks after the initial application of the first treatment
- 6) 16 weeks after the initial application on the first treatment

After the soil cores have been removed from the plots they will be air-dried at room temperature for two weeks before the water droplet penetration test is performed.

Additional data to be collected are dependent on the occurrence of dew, frost or pests and are listed below along with the rating scale to be used.

Dew formation/control – ratings for dew formation should be taken on several occasions during the evaluation when it is apparent that the treatments have had an impact on dew formation. The rating scale is 1 to 9 with 1 = heavy dew present and 9 = no dew present.

Frost formation – ratings for frost formation should be taken on several occasions during the evaluation when frost has occurred. The rating scale is 1 to 9 with 1 = heavy frost present and 9 = no frost present.

Pest damage – ratings for pest damage should be taken whenever pest damage has occurred and it is apparent that the treatments had an impact on the severity of the damage. Insect and disease damage should be rated using a scale of 1 to 9 with 1 = severe damage and 9 = no damage. Weed infestation should be rated using a scale of 0 to 100% based on the percent of the plot area covered by the weed.

Plot size and replications

Minimum plot size is 3 by 3 feet. Larger plots are encouraged if sufficient uniform research area is available. Each treatment should be replicated four times. Plots and replications should be laid out to take the greatest advantage of the hydrophobic soil area. Locating, verifying and utilizing the most uniform hydrophobic areas are essential for a successful wetting agent evaluation.

The plots used for the evaluation in 2003 will be used in 2004 with the treatments being applied to the same plots in both 2003 and 2004.

Statistical Analysis and Reports

The 11 treatments, 10 wetting agents and the untreated control, should be arranged in a randomized complete block design. Treatments within a replication and replications do not have to be contiguous. Statisticians from the National Turfgrass Evaluation (NTEP) will conduct statistical analysis for all sites. The results will be reported for each site along with site characteristics and management practices. The data will not be analyzed and summarized over all locations. Variability in sites and management practices will not permit a valid summary of data over sites.

Research site management

Creeping bentgrass greens in the evaluation must be mowed at a maximum height of 140/1000ths inch at least six days per week. Bermudagrass greens in the evaluation must be mowed at a maximum height of 156/1000ths at least six days per week.

Cultivation that penetrates the soil surface is not allowed during the four-month evaluation period. Grooming and light verticutting are allowed provided the blades do not penetrate the soil surface.

Topdressing is allowed during the evaluation period. Use only 100% sand as the topdressing material. Amendments in the sand may be hydrophobic making the results more difficult to interpret.

Watering practices to be followed during the evaluation are broken down by week and defined as:

- 1) weeks 1 through 8 – water at 70% potential ET for bermudagrass greens and 80% potential ET for creeping bentgrass greens. These crop coefficients are guidelines and may be adjusted to meet the specific conditions at each site. Greens should not be watered every day. Water should be applied deeply and infrequently to the greatest extent possible. During the 1 to 8 week period, greens should be subjected to only slight stress from LDS on plots that are in the middle ranking of turf quality.
- 2) Weeks 9 through 12 – water so moderate stress from LDS appears on plots in the middle ranking of turf quality. Plots should be provided enough water to keep them alive, but moderate stress from LDS should be visible on some but not all plots.
- 3) Weeks 13 through 16 – water as described above for weeks 1 through 8.

Beyond the specific requirements for mowing height, mowing frequency, cultivation, topdressing and watering as outlined above, the putting greens in the evaluation should be maintained as high quality putting turf using the management practices appropriate for the local area.

The research plots should be maintained so there is no substantial loss of turf in the check plots. The check plots should have acceptable quality turf (a rating of 4 or 5) throughout the trial. If supplemental watering is needed in the check plots to insure turf survival please provide the water needed.