

Wetting Agents on Golf Course Surfaces

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Introduction

The objective of this trial was to compare the performance (turfgrass color, surface firmness, and volumetric water content) of 1Solution Wetting Agent at two different rates with three commercially available wetting agent products from August to mid-September on a creeping bentgrass (*Agrostis stolonifera* L.) golf course putting green and a creeping bentgrass fairway.

Materials and Methods

The trial was conducted at the Iowa State University Horticulture Research Station, Ames, Iowa, on a sand-based creeping bentgrass putting green. Turf was cut five days/week at 0.125 in. using a riding reel mower with clippings collected. Irrigation was applied as necessary to avoid turfgrass dormancy in three applications/week totaling 0.5 in./week. Treatments, rates, and timings for this trial are presented in Table 1. Experimental units were 5 ft by 4 ft. Treatments were applied using a CO₂-pressurized backpack sprayer with TeeJet 8004XR nozzles calibrated to apply two gallons water carrier/1,000 ft². Treatment application was 14-day intervals starting August 4 and ending September 1.

Treatments were arranged as a randomized complete block design with four replications. Turfgrass color (not shown) and percent green cover (%) ratings were taken bi-weekly during the experiment with digital image analysis. Each plot also had nine measurements with the Time Domain Reflectance probe (TDR)

for volumetric soil water content at the 3 in. depth and nine locations were tested for surface firmness with the Trufirm device on a bi-weekly basis. Surface firmness was tested with the Trufirm device (mm) before August 4 treatment application and every two weeks after the first treatment application. Repeated wetting agent applications were made immediately following the data collection. The lower the amount of penetration (smaller mm number) the more firm the surface. This trial also was conducted on fairway height (not shown).

Results and Discussion

Before wetting agent application, there were no differences in surface firmness with all plots averaging between 473.3 mm to 442.4 mm (Table 2). After the first application of wetting agent treatments, the Hydration A-Plus offered a greater penetration (mm) than the nontreated control (NTC), all other treatments were not different. Hydration A-Plus had the greatest variation August 18, while the Revolution and 1Solution at the 2 oz/1,000 ft² rate had the lowest variation in surface hardness on the August 18 rating. There were no differences in surface firmness on the September 1 rating between wetting agent treatments. There was much less variation in the treatments on this rating. On the September 15 rating, the Hydration A-Plus had the greatest penetration and was greater than Revolution. There were no differences between other treatments. The least variability was in the Hydration A-Plus and NTC. For the overall average across all ratings, the Hydration A-Plus had the greatest penetration of all treatments and was greater than the NTC, Revolution, 3 oz/1,000 ft² rate of 1Solution, and TriCure. The Hydration A-Plus also had the greatest variability compared with

the other treatments. These results indicate the wetting agent applications generally increased surface firmness (August 4 rating was before treatment application) for many treatments except the Hydration A-Plus. Other wetting agent products produced similar surface hardness values.

There were no differences in volumetric soil water content between treatments before the first application of wetting agents August 4, and plots ranged from 13.6 percent to 10.8 percent (Table 3). The August 18 rating also lacked differences between treatments with values ranging from 11.9 percent down to 10.3 percent. There was minimal variation in TriCure, with greater variation for Revolution and the NTC. The September 1 rating resulted in higher volumetric soil water content for Revolution compared with 1Solution at the 2 oz/1,000 ft². There were no other differences. Again, the TriCure had the least in-plot variation of all treatments, and Revolution had the greatest. The overall average volumetric soil water content for each treatment was not different with the range being 13.7 percent-12.1 percent, and TriCure had the least variation followed by 1Solution at both rates and the NTC. Revolution had the greatest variation on average across all dates.

There were few differences in percent green cover between treatments on many rating dates (Table 4). On August 18, the NTC had the lowest percent green cover than all other treatments. On September 1, the low rate of 1Solution had lower percent than TriCure, Revolution, and the high rate of 1Solution. On the final rating, there were no differences. Averaged across all rating dates the low rate of 1Solution had lower percent green cover than TriCure and Revolution. These differences are very small and would not be noticeable to the human eye. These results indicate these treatments did not markedly change turfgrass percent green cover compared with each other. It appears that on greens height creeping bentgrass, 1Solution at either rate will perform similar to many of the industry standard products on the market without sacrificing appearance (color and cover).

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Table 1. Treatment descriptions and timing for golf course surface wetting agent trial, Ames, Iowa.

Product	Rate (oz/1,000ft ²)	Frequency of application
TriCure	3	2 weeks
Revolution	3	2 weeks
1Solution	3	2 weeks
1Solution	2	2 weeks
Hydration A-Plus	1.5	2 weeks
Nontreated Check	---	

Table 2. Creeping bentgrass putting green surface firmness.^a

Treatment	Rate ^b	Rating date									
		Aug. 4		Aug. 18		Sept. 1		Sept. 15		Mean	
		mm	Std. dev	mm	Std. dev	mm	Std. dev	mm	Std. dev	mm	Std. dev
TriCure	3	450.3	30.0	380.9	33.4	395.3	21.7	364.8	19.4	397.8	39.9
Revolution	3	473.3	13.3	388.6	11.1	395.8	19.2	345.3	32.7	400.7	51.2
1Solution	3	460.0	27.1	379.5	27.6	409.4	16.1	360.2	25.0	402.3	44.6
1Solution	2	470.7	16.3	393.7	18.8	405.3	19.2	364.5	34.4	408.5	45.1
Hydration A-Plus	1.5	465.7	24.3	553.2	29.5	388.8	14.0	379.6	2.1	446.8	15.1
Nontreated Check	--	442.4	21	321.3	22.2	391.6	14.9	364.4	1.8	379.9	48.4
	LSD (0.05)	26.8		178.3		25.1		22.7		43.7	

^aAs determined by nine random drops of the TruFirm (mm) on each plot receiving various wetting agents and rates applied every two weeks, Ames, Iowa.

^bRate = oz/1,000 ft².

Table 3. Creeping bentgrass putting green volumetric soil water content (VWC) (%).^a

Treatment	Rate ^b	Rating date									
		Aug. 4		Aug. 18		Sept. 1		Sept. 15		Mean	
		VWC	Std. dev	VWC	Std. dev	VWC	Std. dev	VWC	Std. dev	VWC	Std. dev
TriCure	3	11.7	2.3	10.7	1	15.9	1.6	11.4	1.4	12.4	2.6
Revolution	3	13.6	6.6	11.9	6.3	17.5	4.1	11.7	2.8	13.7	5.2
1Solution	3	11.8	3.9	11.4	2.7	16.8	1.9	12.1	1.9	13.0	3.3
1Solution	2	11.4	1.9	10.4	2.5	14.9	2.5	11.8	2.7	12.1	2.8
Hydration A-Plus	1.5	13	3.4	11.3	3.1	17.2	2.3	12.3	2.1	13.5	3.4
Nontreated Check	--	10.8	2.8	10.3	4.2	15.7	1.0	11.7	1.8	12.1	3.3
	LSD (0.05)	4.1		3.5		2.5		1.7		2.5	

^aAs determined by nine random tests with a TDR Probe at 3-in. depth on each plot with various wetting agents and rates applied every two weeks, Ames, Iowa.

^bRate = oz/1,000 ft².

Table 4. Creeping bentgrass percent green cover (%).^a

Treatment	Rate ^b	Rating date				
		Aug. 4	Aug. 18	Sept. 1	Sept. 15	Mean
		Cover	Cover	Cover	Cover	Cover
TriCure	3	98.0	99.0	98.0	96.0	98.0
Revolution	3	98.0	99.0	98.0	97.0	98.0
1Solution	3	98.0	99.0	98.0	96.0	97
1Solution	2	98.0	99.0	92.0	93.0	95.0
Hydration A-Plus	1.5	98.0	99.0	96.0	94.0	97.0
Nontreated Check	--	98.0	93.0	96.0	97.0	96.0
	LSD (0.05)	0.5	5.1	4.0	4.3	2.6

^aAs determined by digital image analysis on each plot receiving various wetting agents and rates applied every two weeks, Ames, Iowa.

^bRate = oz/1,000 ft².