

SMS Surfactant Trials, 2010

Turfgrass Disease Solutions, LLC Steven McDonald, M.S. and Rick Grala

Methods: Four direct comparisons were made on a sand based creeping bentgrass tee at Bellewood Golf Club located in Pottstown, PA. The turfgrass was comprised of mature PennTrio creeping bentgrass. This area has inadequate irrigation coverage and is prone to severe localized drying. As most, soils, however, it is not uniform.

Treatments application dates are noted in individual tables. Treatments were applied using a CO₂ pressurized sprayer at 38 psi and calibrated to deliver 88 gallons of water per acre. All treatments were immediately watered into the turfgrass using 0.25 inches of water from a hose with a meter. No treatment induced injury or phytotoxicity was observed.

Weather for the trial period was marked by prolonged dry periods with above average temperatures. The plots were irrigated to replace approximately 50% of evapotranspiration and severe drought was observed in the trial area.

Plots were visually rated for color, quality and % LDS. Turfgrass color on 0-10 scale where 5= color of untreated turf and 10= optimal color. Turfgrass quality on 0-10 scale where 7= color of untreated turf and 10= optimal quality. Percent localized dry spot (%LDS) was rated on a 0 to 100 scale where 0= none and 100= entire plot area symptomatic of dry spot. NDVI was measured using Spectrum Technologies Turf color meter. Water drop penetration test was performed at 0 (soil interface), 1, 2, 3, 4, 5, and 6 cm depth. Three cores per plot were used. The cores were allowed to air dry for 10-12 days prior to drop test. Droplets that did not penetrate the core for 10 minutes (600 seconds) were recorded as >600 seconds. Percent Volumetric Water (%VWC) were collected from each plot using a Spectrum Technologies TDR moisture meter. Five measurements per plot were be taken weekly at both 1.5 and 3.0 inches depth. Data were subject to ANOVA and separated using Tukey's Test (p=0.05).

Comparison of SMS400, 1428 and Magnus: These data are shown in tables 1-9. On 4 August, there was few significant differences, however, agronomically important trends will be discussed. At 0 cm (on 4 August) all treatments had similar levels of water penetration times which were significantly less than the untreated control. On 10 August, at 0 cm soil treated with SMS400 and 1428 had quicker water penetration when compared to the untreated and Magnus. At 1 and 2 cm, all treated plots had quicker water penetration when compared to the untreated and a greater than 3 cm few consistent differences were observed. On 18 August, there was few differences at 0 cm, however treated plots had much quicker water penetration at 1, 2, and 3 cm, when compared to the untreated. Few differences among treatments were observed at these depths. On 11 September there was few differences observed.

Table 1. Comparison of SMS 400, 1428, and Magnus: Water drop penetration test: 29 July 2010

Rating Date				29 July 2010 (Initial)						
Rating Type				Seconds to penetrate soil at various depth***						
Depth				0 cm	1 cm	2 cm	3 cm	4 cm	5 cm	6 cm
Trt No.	Treatment* Name	Rate per 1000 ft2	Appl Code							
1	Untreated			101.0 a	58.3 a	43.3 a	16.0 a	3.7 a	2.3 a	1.3 a
2	SMS400	4.0 fl oz	A	54.0 b	56.7 a	29.3 a	7.0 a	1.0 a	1.0 a	1.7 a
3	SMS-EXP-1428	4.0 fl oz	A	98.0 ab	68.3 a	24.7 a	10.7 a	1.3 a	2.0 a	1.7 a
4	Magnus	4.0 fl oz	A	72.0 ab	33.3 a	30.0 a	9.7 a	4.7 a	3.3 a	3.0 a
Treatment Prob(F)				0.0331	0.3514	0.2121	0.7337	0.2617	0.7237	0.6267

* Treatments were applied on 29 July (A) 2010

** Means followed by same letter do not significantly differ (P=.05, Tukey's HSD).

*** Water drop penetration test at 0 (soil interface), 1, 2, 3, 4, 5, and 6 cm depth. Three cores per plot were used. The cores were allowed to air dry for 10-12 days prior to drop test. Droplets that did not penetrate the core for 10 minutes (600 seconds) were recorded as >600 seconds.

Table 2. Continued: 4 August 2010

Rating Date				4 August						
Rating Type				Seconds to penetrate soil at various depth***						
Depth				0 cm	1 cm	2 cm	3 cm	4 cm	5 cm	6 cm
Trt No.	Treatment* Name	Rate per 1000 ft2	Appl Code							
1	Untreated			31.0 a	8.0 a	7.7 a	7.8 a	2.2 a	2.0 a	2.0 a
2	SMS400	4.0 fl oz	A	15.8 a	12.5 a	16.3 a	7.0 a	5.8 a	6.0 a	4.0 a
3	SMS-EXP-1428	4.0 fl oz	A	20.0 a	11.0 a	11.5 a	14.2 a	11.7 a	9.5 a	3.3 a
4	Magnus	4.0 fl oz	A	31.5 a	12.2 a	13.3 a	7.8 a	4.2 a	3.8 a	3.3 a
Treatment Prob(F)				0.1520	0.8342	0.6776	0.8250	0.6273	0.7616	0.9256

* Treatments were applied on 29 July (A)

** Means followed by same letter do not significantly differ (P=.05, Tukey's HSD).

*** Water drop penetration test at 0 (soil interface), 1, 2, 3, 4, 5, and 6 cm depth. Three cores per plot were used. The cores were allowed to air dry for 10-12 days prior to drop test. Droplets that did not penetrate the core for 10 minutes (600 seconds) were recorded as >600 seconds.

Table 3. Continued 10 August

Rating Date				10 August 2010						
Rating Type				Seconds to penetrate soil at various depth***						
Depth				0 cm	1 cm	2 cm	3 cm	4 cm	5 cm	6 cm
Trt No.	Treatment* Name	Rate per 1000 ft2	Appl Code							
1	Untreated			98.2 ab	84.5 a	62.7 a	45.2 a	58.2 a	53.0 a	24.7 a
2	SMS400	4.0 fl oz	A	43.3 b	14.7 b	22.0 a	29.2 a	33.3 a	23.3 a	18.0 a
3	SMS-EXP-1428	4.0 fl oz	A	31.5 b	23.3 ab	14.2 a	79.0 a	94.2 a	93.0 a	93.7 a
4	Magnus	4.0 fl oz	A	115.0 a	53.8 ab	53.2 a	73.7 a	73.2 a	31.5 a	6.0 a
Treatment Prob(F)				0.0153	0.0291	0.1100	0.3634	0.3796	0.2254	0.3619

* Treatments were applied on 29 July (A).

** Means followed by same letter do not significantly differ (P=.05, Tukey's HSD).

*** Water drop penetration test at 0 (soil interface), 1, 2, 3, 4, 5, and 6 cm depth. Three cores per plot were used. The cores were allowed to air dry for 10-12 days prior to drop test. Droplets that did not penetrate the core for 10 minutes (600 seconds) were recorded as >600 seconds.

Table 4. Continued: 18 August 2010

Rating Date				18 August						
Rating Type				Seconds to penetrate soil at various depth***						
Depth				0 cm	1 cm	2 cm	3 cm	4 cm	5 cm	6 cm
Trt No.	Treatment* Name	Rate per 1000 ft2	Appl Code							
1	Untreated			180.97 a	110.42 a	108.52 a	110.02 a	102.92 a	66.19 a	52.26 a
2	SMS400	4.0 fl oz	A	178.88 a	85.69 ab	39.78 ab	33.78 ab	95.16 a	139.02 a	64.02 a
3	SMS-EXP-1428	4.0 fl oz	A	169.83 ab	35.09 ab	22.80 b	21.19 ab	84.14 a	89.54 a	34.83 a
4	Magnus	4.0 fl oz	A	104.07 b	26.66 b	18.02 b	17.76 b	21.02 a	21.76 a	6.142 a
Treatment Prob(F)				0.0320	0.0239	0.0237	0.0383	0.2941	0.0742	0.2685

* Treatments were applied on 29 July (A).

** Means followed by same letter do not significantly differ (P=.05, Tukey's HSD).

*** Water drop penetration test at 0 (soil interface), 1, 2, 3, 4, 5, and 6 cm depth. Three cores per plot were used. The cores were allowed to air dry for 10-12 days prior to drop test. Droplets that did not penetrate the core for 10 minutes (600 seconds) were recorded as >600 seconds.

Table 5. Continued: 11 September 2010

Rating Date				11 September						
Rating Type				Seconds to penetrate soil at various depth***						
Depth				0 cm	1 cm	2 cm	3 cm	4 cm	5 cm	6 cm*
Trt No.	Treatment* Name	Rate per 1000	Appl Code							
1	Untreated			55.78 b	31.90 a	22.90 a	32.16 a	22.78 a	14.07 a	
2	SMS400	4.0 fl oz	A	85.59 b	61.09 a	49.57 a	45.64 a	57.83 a	31.26 a	
3	SMS-EXP-1428	4.0 fl oz	A	143.21 a	44.16 a	52.26 a	29.19 a	29.54 a	26.61 a	
4	Magnus	4.0 fl oz	A	78.40 b	23.61 a	23.19 a	49.66 a	57.11 a	32.88 a	
Treatment Prob(F)				0.0088	0.1922	0.3624	0.4835	0.2621	0.8643	

* Treatments were applied on 29 July (A)

** Means followed by same letter do not significantly differ (P=.05, Tukey's HSD).

*** Water drop penetration test at 0 (soil interface), 1, 2, 3, 4, 5, and 6 cm depth. Three cores per plot were used. The cores were allowed to air dry for 10-12 days prior to drop test. Droplets that did not penetrate the core for 10 minutes (600 seconds) were recorded as >600 seconds.

* Data missing, soil samples all feel apart at 6 cm level

Table 6. Turfgrass Quality as impacted by various surfactant

Rating Date				Jul-29	Aug-3	Aug-10	Aug-18	Sep-11
Rating Type				Turfgrass Quality (0-10)***				
Trt No.	Treatment* Name	Rate per 1000	Appl Code					
1	Untreated			8.0 a	6.7 b	5.3 a	5.67 a	5.0 a
2	SMS400	4.0 fl oz	A	8.0 a	8.0 a	7.3 a	7.00 a	6.7 a
3	SMS-EXP-1428	4.0 fl oz	A	8.0 a	8.0 a	6.7 a	6.77 a	6.7 a
4	Magnus	4.0 fl oz	A	8.0 a	8.0 a	6.0 a	5.87 a	5.3 a
Treatment Prob(F)				1.0000	0.0029	0.3050	0.4288	0.3965

* Treatments were applied on 29 July (A) and 4 August (B)

** Means followed by same letter do not significantly differ (P=.05, Tukey's HSD).

*** Turfgrass quality on 0-10 scale where 7= acceptable threshold for quality and 10= optimal quality

Table 7. Percent localized drought spot as impacted by surfactant

Rating Date		Jul-29	Aug-3	Aug-10	Aug-18	Sep-11		
Rating Type		Percent LDS***						
Trt	Treatment*	Rate	Appl					
No.	Name	per 1000 ft2	Code					
1	Untreated			0.0 a	8.3 a	33.3 a	43.3 a	47.0 a
2	SMS400	4.0 fl oz	A	0.7 a	0.0 b	5.0 b	12.0 a	21.7 a
3	SMS-EXP-1428	4.0 fl oz	A	4.0 a	0.0 b	10.0 ab	13.0 a	22.3 a
4	Magnus	4.0 fl oz	A	0.0 a	0.0 b	4.3 b	14.7 a	33.3 a
Treatment Prob(F)				0.1170	0.0025	0.0180	0.0481	0.4734

* Treatments were applied on 29 July (A) and 4 August (B)

** Means followed by same letter do not significantly differ (P=.05, Tukey's HSD).

*** Percent localized dry spot (%LSD) was rated on a 0-100 scale where 0= none and 100= entire plot area symptomatic of dry spot.

Table 8. Turfgrass color as impacted by various surfactant treatments.

Rating Date		Jul-29	Aug-3	Aug-10	Aug-18	Sep-11		
Rating Type		Turfgrass Color (0-10)***						
Trt	Treatment*	Rate	Appl					
No.	Name	per 1000 ft2	Code					
1	Untreated			5.0 a	5.0 a	5.0 a	5.0 a	5.0 a
2	SMS400	4.0 fl oz	AB	5.0 a	5.0 a	5.0 a	5.0 a	5.0 a
3	SMS-EXP-1428	4.0 fl oz	AB	5.0 a	5.0 a	5.0 a	5.0 a	5.0 a
4	Magnus	4.0 fl oz	AB	5.0 a	5.0 a	5.0 a	5.0 a	5.0 a
Treatment Prob(F)				1.000	1.000	1.000	1.000	1.000

* Treatments were applied on 29 July (A) and 4 August (B)

** Means followed by same letter do not significantly differ (P=.05, Tukey's HSD).

*** Turfgrass color on 0=10 scale where 7= color of untreated turf and 10= optimal color.

Table 9. NDVI as impacted by various surfactant treatments, 2010.

Rating Date		Aug-3	Aug-10	Aug-17	Aug-25	Sep-1	Sep-11		
Rating Type		NDVI***							
Trt	Treatment*	Rate	Appl						
No.	Name	per 1000 ft2	Code						
1	Untreated			0.6655 a	0.6933 a	0.6539 a	0.6311 a	0.5254 a	0.5864 a
2	SMS400	4.0 fl oz	AB	0.6715 a	0.6856 a	0.6574 a	0.6367 a	0.5683 a	0.6126 a
3	SMS-EXP-1428	4.0 fl oz	AB	0.6859 a	0.6933 a	0.6576 a	0.6457 a	0.6076 a	0.6141 a
4	Magnus	4.0 fl oz	AB	0.6484 a	0.6955 a	0.6497 a	0.6227 a	0.5766 a	0.6099 a
Treatment Prob(F)				0.8311	0.9302	0.9302	0.6666	0.1920	0.4208

* Treatments were applied on 29 July (A) and 4 August (B)

** Means followed by same letter do not significantly differ (P=.05, Tukey's HSD).

*** Turfgrass color on 0=10 scale where 7= color of untreated turf and 10= optimal color.