SMS Surfactant Trials, 2010

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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 SMS700, 1368,1370: This trials' data is shown in tables 1-9. For each of these trials, the most critical data to focus on is the water drop penetration test. Drop test data are shown in table 1. All drop test were similar for the 29 July measurements. By 4 August, there was no consistent trends at 0 and 1 cm depths. At 2 and 4 cm, however, all treated plots (SMS 700, 1368 and 1370) all had agronomically quicker penetration. These treatments were re-applied on 4 August. By 10 August, the treated plots had significantly quicker penetration times at 0,1,2, and 3 cm of depth. No significant differences were observed on that date, however, there was trends with suggest at 0, 1, and 2 that plots treated with 1370 had slightly quicker penetration. By 18 August, the observations at 0 cm depth were not as clear. However, at 1, 2 and 3 cm depth all treated plots had significantly quicker and similar penetration. By 11 September there was few consistent differences among treated and untreated plots.

All treated plots had better quality than the untreated plot and this could be attributed to less localized drought spots, and overall visible density. On 3 August, the treated plots had no localized drought spots, however, this was shorted lived and by 18 August severe drying was observed in all plots. Generally, there was few other differences among treatments observed. None of the treatments significantly increase color (ie. fertilizer-greening response).

Table 1. Comparison of SMS 700, 1368, 1370: 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 ab	43.3 a	16.0 a	3.7 a	2.3 a	1.3 a
2	SMS700	7 fl oz	AB	58.0 a	44.7 ab	33.0 a	14.0 a	8.0 a	2.3 a	2.3 a
3	SMS-EXP-1368	7 fl oz	AB	77.3 a	40.0 b	39.0 a	12.7 a	6.7 a	6.3 a	1.0 a
4	SMS-EXP-1370	7 fl oz	AB	92.7 a	71.7 a	40.3 a	24.7 a	14.7 a	1.0 a	3.3 a
Treatment Prob(F)				0.3275	0.0284	0.5942	0.3732	0.2731	0.0701	0.2853

* 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).

******* 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	SMS700	7 fl oz	AB	31.0 a	15.0 a	1.8 a	1.0 a	1.0 a	1.0 a	1.0 a
3	SMS-EXP-1368	7 fl oz	AB	8.5 a	6.3 a	1.5 a	1.0 a	1.0 a	1.0 a	1.0 a
4	SMS-EXP-1370	7 fl oz	AB	14.3 a	16.2 a	4.3 a	3.3 a	1.8 a	1.0 a	1.0 a
Treatment Prob(F)				0.0320	0.6310	0.2315	0.4728	0.6430	0.4547	0.4547

* 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).

******* 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 a**	84.5 a	62.7 a	45.2 a	58.2 a	53.0 a	24.7 a
2	SMS700	7 fl oz AB	23.2 b	21.0 b	8.3 b	5.8 b	2.8 a	2.5 a	3.0 a
3	SMS-EXP-1368	7 fl oz AB	18.0 b	16.3 b	7.5 b	2.2 b	1.0 a	1.0 a	1.0 a
4	SMS-EXP-1370	7 fl oz AB	10.5 b	5.2 b	6.2 b	6.3 b	13.2 a	9.7 a	14.0 a
Treatment Prob(F)			0.0015	0.0036	0.0251	0.0001	0.0480	0.0726	0.3270

* 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).

******* 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		180.9 a	110.42 a	108.52 a	110.02 a	102.92 a	66.19 a	52.26 a
2	SMS700	7 fl oz AB	188.6 a	86.90 a	24.14 b	24.92 a	23.90 a	16.40 a	7.85 a
3	SMS-EXP-1368	7 fl oz AB	92.0 a	56.83 a	23.30 b	48.88 a	90.23 a	56.52 a	36.64 a
4	SMS-EXP-1370	7 fl oz AB	91.66 a	33.52 a	35.26 ab	13.30 a	56.78 a	82.54 a	52.47 a
Treatment Prob(F)			0.0634	0.2106	0.0252	0.0501	0.0861	0.0868	0.2313

* 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).

******* 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 ft2	Appl Code						
1	Untreated			55.78 a	31.90 a	22.90 a	32.16 a	22.78 a	14.07 a	
2	SMS700	7 fl oz	AB	112.8 a	60.78 a	22.59 a	16.02 a	9.57 a	8.61 a	
3	SMS-EXP-1368	7 fl oz	AB	63.11 a	57.50 a	27.57 a	32.92 a	25.00 a	20.16 a	
4	SMS-EXP-1370	7 fl oz	AB	58.88 a	35.02 a	13.40 a	32.78 a	27.33 a	21.40 a	
Treatment Prob(F)				0.3835	0.6527	0.7023	0.8983	0.8132	0.8642	

* 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).

******* 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 ft2	Appl Code					
1	Untreated			8.0 a	6.7 b	5.33 a	5.67 a	5.93 ab
2	SMS700	7 fl oz	AB	8.0 a	8.0 a	7.83 a	8.00 a	8.00 a
3	SMS-EXP-1368	7 fl oz	AB	8.0 a	8.0 a	6.33 a	6.00 a	5.53 ab
4	SMS-EXP-1370	7 fl oz	AB	8.0 a	7.7 a	5.33 a	5.00 a	3.80 b
Treatment Prob(F)				1.0000	0.0079	0.2170	0.2371	0.0294

* 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 No.	Treatment* Name	Rate per 1000 ft2	Appl Code				
1	Untreated			0.0 a	8.3 a	33.3 a	43.3 a	47.0 a
2	SMS700	7 fl oz	AB	1.0 a	0.0 b	1.7 b	4.3 a	5.0 a
3	SMS-EXP-1368	7 fl oz	AB	0.7 a	0.0 b	19.3 ab	28.3 a	35.3 a
4	SMS-EXP-1370	7 fl oz	AB	2.7 a	0.0 b	15.3 ab	27.3 a	36.0 a
Treatment Prob(F)				0.2423	0.0025	0.0327	0.1052	0.1031

* 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 No.	Treatment* Name	Rate per 1000 ft2	Appl Code				
1	Untreated			5.0 a	5.0 a	5.0 a	5.0 a	5.0 a
2	SMS700	7 fl oz	AB	5.0 a	5.0 a	5.0 a	5.0 a	5.0 a
3	SMS-EXP-1368	7 fl oz	AB	5.0 a	5.0 a	5.0 a	5.0 a	5.0 a
4	SMS-EXP-1370	7 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 No.	Treatment* Name	Rate per 1000 ft2	Appl Code					
1	Untreated			0.6655 a	0.6933 a	0.6539 a	0.6311 a	0.5254 a	0.5864 a
2	SMS700	7 fl oz	AB	0.6836 a	0.6845 a	0.6507 a	0.6485 a	0.6157 a	0.6529 a
3	SMS-EXP-1368	7 fl oz	AB	0.6597 a	0.6600 a	0.6523 a	0.6166 a	0.5795 a	0.6330 a
4	SMS-EXP-1370	7 fl oz	AB	0.6737 a	0.6740 a	0.6251 a	0.6137 a	0.5215 a	0.5889 a
Treatment Prob(F)				0.8558	0.7215	0.5519	0.7151	0.0381	0.0986

* 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.