-----EFFECTS OF SMS-700 WETTING AGENT ON CREEPING BENTGRASS AND SOIL WATER REPELLENCY

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INTRODUCTION

Water repellent soils have been observed for many years in grasslands (1) forests (2) and citrus groves (3). They have become an increasing problem on golf greens since 1960, when the United States Golf Association recommended that golf green topsoil mix should contain at least 90% sand (23). Symptoms of these water repellent soils begin as small irregular shaped areas of drought-stressed turfgrass known as localized dry spots (4,5,6,7,8,9,10,11,12,13,14,15,16,17,18, 20,21,22,25). If left untreated these areas can increase in size and become excessively dry. Large areas of turfgrass can be severely damaged. Research has shown that the sand particles in the localized dry spots are covered with an organic coating, which renders them water repellent (5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,22,25). The problem is most evident during late spring, summer and early fall.

Currently, hand-watering, syringing, coring and the use of wetting agents are the best methods for controlling localized dry spots (4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21, 22,25) caused by water repellent soils. However, wetting agents are potentially phytotoxic to turfgrasses if improperly used. The objectives of this research were:

1. To determine the effects of SMS-700 wetting agent on creeping bentgrass color and quality.
2. To determine the effects of SMS-700 wetting agent on soil water repellency.

MATERIALS AND METHODS

The field experiment was initiated June 19, 2006 on the University of Georgia Experimental Golf Green that was built in 1996 to USGA specifications with a topsoil mix consisting of 85% sand and 15% peat (23). The green consists of 325.2 square meters (3500 $ft.^2$) of 'Penncross' creeping bentgrass (*Agrostis stoloniferous* var. *palustris*). The green was mowed at 0.64 cm (0.25 inch) and irrigated as needed with 0.95 cm (0.375 inch) of water when sufficient rainfall did not occur. Regular maintenance practices (fertilizer and pesticide applications) were performed as needed. Daily temperature and rainfall were recorded for the duration of the experiment (Appendix).

Treatments were applied to 0.61 X 0.61 meter (2 X 2 ft.) plots with a CO_2 backpack sprayer. Immediately after application, treatments were irrigated into the soil with 0.64 cm (0.25 inch) of water. The following treatments were applied:

1. SMS-700: 22.3 l/ha (7 oz./1000 $ft.^2$) in 1,222.3 liters of water/ha (3.0 gallons of water /1000 $ft.^2$) applied on 6/19/06, 6/26/06 and 9/24/06.
2. SMS-700: 22.3 l/ha (7 oz./1000 $ft.^2$) in 1,222.3 liters of water/ha (3.0 gallons of water /1000 $ft.^2$) applied on 6/19/06, 6/26/06 and 7/26/06.
3. Control.

Visual turfgrass color (1 to 9, 1 = brown, dead turf and 9 = dark green, healthy turf) and quality (1 to 9, 1 = very poor quality and 9 = excellent quality) ratings were taken on 6/1906 (before treatment application), 6/20/06, 6/22/06, 6/26/06, 7/17/06, 8/14/06, 9/11/06, 10/9/06, 11/6/06 and 12/4/06.

Soil water repellency was determined by the molarity of ethanol droplet test (MED) on 6/19/06 (before treatment application), 6/26/06, 7/17/06, 8/14/06, 9/11/06, 10/9/06, 11/6/06 and 12/4/06 (24). Soil samples were taken with a 0.64 cm (0.25 inch) soil probe to a depth of 5 cm (2.0 in.). Five soil samples were taken from each plot and combined into one bulk sample per

plot. Samples were dried for 24 hours in an oven at 35 C (95 F). After drying, samples were removed from the oven and allowed to equilibrate to room temperature [21.1 - 23.9 C (70 - 75 F)] and humidity (60 - 65%). Samples were sieved through a 2 mm (#10 United States Standard Series) mesh screen and the MED test was performed on the sieved, dried soil.

The soil was placed in a 5 cm (2.0 in.) diameter X 1 cm (0.39 in.) deep dish to provide a uniform surface and depth. A series of 40 uL aqueous ethanol droplets at 0.4 M intervals were placed on the soil surface. The molarity of the droplet that completely infiltrated within 5 seconds was recorded as the soil MED value (0 = non-water repellent, 4 = extremely water repellent). Experimental design was a randomized complete block with four replications per treatment. Data were subjected to analysis of variance (ANOVA) procedures with treatment means separated by Duncan's Multiple Range Test at the 0.05 level of probability.

RESULTS AND DISCUSSION

Turfgrass Color

No differences in turfgrass color were observed before initial treatment application (Table 1). On 6/19/06 experimental plots had an average turfgrass color rating of 8.0 (Table 1). On 6/20/06 and 6/22/06 turfgrass color ratings of both treatments were lower than the color ratings of the control. However, no difference in turfgrass color was observed between the two treatments (Table 1). No differences in turfgrass color were observed among the treatments and control on 6/26/06, 7/17/06, 8/14/06, 9/11/06, 10/9/06, 11/6/06 and 12/4/06.

Turfgrass Quality

No differences in turfgrass quality were observed before initial treatment application (Table 2). On 6/19/06 experimental plots had an average turfgrass quality rating of 8.4 (Table 2). No differences in turfgrass quality were observed among the treatments and control on any observation date (Table 2).

Soil Water Repellency

High soil water repellency (MED 2.8 to 2.9) was observed for all plots before initial treatment application on 6/19/06 (Table 3). On 6/26/06 and 7/17/06, soil water repellency of both treatments was lower than the control (Table 3). However, no difference in soil water repellency was observed between the two treatments (Table 3).

On 8/14/06 soil water repellency of the SMS-700 (Application Dates: 6/19/06, 6/26/06, 7/26/06) treated plots was lower than the control plots and the SMS-700 (Application Dates: 6/19/06, 6/26/06, 9/24/06) treated plots (Table 3). Soil water repellency of the SMS-700 (Application Dates: 6/19/06, 6/26/06, 9/24/06) treated plots was lower than the control plots, but higher than the soil water repellency of the SMS-700 (Application Dates: 6/19/06, 6/26/06, 7/26/06) treated plots (Table 3). The SMS-700 (Application Dates: 6/19/06, 6/26/06, 7/26/06) treatment received a third application on 7/26/06. Therefore, the soil water repellency of these plots was lower than the soil water repellency of the SMS-700 (Application Dates: 6/19/06, 6/26/06, 9/24/06) treated plots that did not received a third application before the 8/14/06 observation date.

On 9/11/06 soil water repellency of the SMS-700 (Application Dates: 6/19/06, 6/26/06, 7/26/06) treated plots was lower than the control plots and the SMS-700 (Application Dates: 6/19/06, 6/26/06, 9/24/06) treated plots (Table 3). No difference in soil water repellency was observed between the SMS-700 (Application Dates: 6/19/06, 6/26/06, 9/24/06) treatment and the control (Table 3). As previously stated, the difference in soil water repellency observed between the two treatments was due to the fact that the SMS-700 (Application Dates: 6/19/06, 6/26/06, 7/26/06) treatment was reapplied on 7/26/06. In contrast, the SMS-700 (Application Dates: 6/19/06, 6/26/06, 9/24/06) treated plots did not receive a third application before the 9/11/06 observation date.

On 10/9/06 and 11/6/06 soil water repellency of the SMS-700 (Application Dates: 6/19/06, 6/26/06, 9/24/06) treated plots was lower than the control plots and the SMS-700 (Application Dates: 6/19/06, 6/26/06, 7/26/06) treated plots (Table 3). No difference in soil water repellency was observed between the control plots and the SMS-700 (Application Dates: 6/19/06, 6/26/06, 7/26/06) treated plots (Table 3). The SMS-700 (Application Dates: 6/19/06, 6/26/06, 9/24/06) treatment received a third application on 9/24/06, whereas the SMS-700 (Application Dates: 6/19/06, 6/26/06, 7/26/06) treated plots received a third application on 7/26/06. However, the data indicate that on the 10/9/06 observation date, the effectiveness of the SMS-700 (Application Dates: 6/19/06, 6/26/06, 7/26/06) had dissipated. No differences in soil water repellency were observed among the treatments and control on 12/4/06 (Table 3).

SUMMARY

Under the conditions of this study, the data indicate that SMS-700 can cause a reduction in turfgrass color. However, SMS-700 did not reduce turfgrass quality. During the first week after the initial application, a reduction in color was observed on plots treated with SMS-700. However, the reduction in color was not severe and dissipated within 7 days. In terms of soil water repellency, the data indicate that SMS-700 can reduce soil water repellency. The results of this study indicate that the average efficacy of two or three applications of SMS-700 at least 46 days from the date of the second or third application, but less than 74 days**.**

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Table 1. 'Penncross' creeping bentgrass color as affected by SMS-700 wetting agent.

Treatment	Application Dates		6/19[1]	6/20	6/22	6/26	7/17	8/14	9/11	10/9	11/6	12/4
			Color[2]									
SMS-700 - 22.3 l/ha	6/19, 6/26, 9/24	8.1a[3]	7.4b	7.3b	7.6a	7.8a	7.3a	7.0a	6.9a	7.3a	7.6a	
SMS-700 - 22.3 l/ha	6/19, 6/26, 7/26	8.0a	7.3b	7.3b	7.8a	7.8a	7.5a	6.9a	7.4a	7.4a	7.5a	
Control	-----		8.0a	8.1a	8.0a	8.1a	7.9a	7.1a	7.1a	7.0a	7.5a	7.9a

[1]Color ratings taken before initial treatment application.
[2]Color - 1 to 9 (1 = brown, dead turf and 9 = dark green, healthy turf).
[3]Means in the same column joined by the same letter are not significantly different at the 0.05 level of probability according to Duncan's Multiple Range Test.

Table 2. 'Penncross' creeping bentgrass quality affected by SMS-700 wetting agent.

Treatment	Application Dates		6/19[1]	6/20	6/22	6/26	7/17	8/14	9/11	10/9	11/6	12/4
			Quality[2]									
SMS-700 - 22.3 l/ha	6/19, 6/26, 9/24	8.5a[3]	8.4a	8.3a	8.1a	8.3a	7.4a	7.0a	7.5a	7.5a	8.1a	
SMS-700 - 22.3 l/ha	6/19, 6/26, 7/26	8.4a	8.4a	8.3a	8.3a	8.1a	7.8a	7.1a	7.5a	7.8a	7.9a	
Control	-----		8.3a	8.3a	8.4a	8.4a	8.4a	7.5a	7.1a	7.6a	7.6a	8.1a

[1]Quality ratings taken before initial treatment application.
[2]Quality - 1 to 9 (1 = very poor quality and 9 = excellent quality).
[3]Means in the same column joined by the same letter are not significantly different at the 0.05 level of probability according to Duncan's Multiple Range Test.

Table 3. Soil water repellency as affected by SMS-700 wetting agent.

Treatment	Application Dates		6/19[1]	6/26	7/17	8/14	9/11	10/9	11/6	12/4
			----------Soil Water Repellency[2]----------							
SMS-700 - 22.3 l/ha	6/19, 6/26, 9/24	2.9a[3]	0.3b	1.4b	1.8b	2.1a	0.3b	1.7b	2.1a	
SMS-700 - 22.3 l/ha	6/19, 6/26, 7/26	2.8a	0.2b	1.3b	0.8c	1.0b	2.3a	2.3a	2.4a	
Control	-----		2.9a	2.9a	2.7a	2.4a	2.3a	2.5a	2.5a	2.5a

[1]Soil water repellency readings taken before initial treatment application.
[2]Soil Water Repellency - 0.0 to 4.0 (0.0 = non-water repellent and 4.0 = extremely water repellent).
[3]Means in the same column joined by the same letter are not significantly different at the 0.05 level of probability according to Duncan's Multiple Range Test.

APPENDIX

2006
WEATHER DATA

Daily maximum and minimum temperatures and rainfall data of June 2006 at the University of Georgia Rhizotron and Turfgrass Facility.

Date	Maximum Temp F	Maximum Temp C	Minimum Temp F	Minimum Temp C	Rainfall (in)	Rainfall (cm)
6/1	91	32.8	66	18.9	Trace	Trace
6/2	89	31.7	66	18.9	0.49	1.24
6/3	87	30.6	64	17.8	Trace	Trace
6/4	86	30.0	58	14.4	0.00	0.00
6/5	82	27.8	55	12.8	0.00	0.00
6/6	84	28.9	53	11.7	0.00	0.00
6/7	88	31.1	56	13.3	0.00	0.00
6/8	91	32.8	62	16.7	0.00	0.00
6/9	91	32.8	60	15.6	0.00	Trace
6/10	96	35.6	63	17.2	0.00	Trace
6/11	98	36.7	68	20.0	0.00	0.00
6/12	95	35.0	72	22.2	Trace	Trace
6/13	73	22.8	65	18.3	0.09	0.23
6/14	93	33.9	65	18.3	0.02	0.05
6/15	90	32.2	59	15.0	0.00	0.00
6/16	91	32.8	62	16.7	0.00	0.00
6/17	90	32.2	59	15.0	0.00	0.00
6/18	90	32.2	60	15.6	0.00	0.00
6/19	95	35.0	64	17.8	0.00	Trace
6/20	98	36.7	66	18.9	0.00	0.00
6/21	100	37.8	66	18.9	0.00	0.00
6/22	102	38.9	68	20.0	Trace	Trace
6/23	99	37.2	70	21.1	0.05	0.13
6/24	92	33.3	69	20.6	0.02	0.05
6/25	95	35.0	69	20.6	0.02	0.05
6/26	77	25.0	69	20.6	1.24	3.15
6/27	89	31.7	70	21.1	0.00	0.00
6/28	91	32.8	65	18.3	Trace	Trace
6/29	92	33.3	65	18.3	0.00	0.00
6/30	92	33.3	64	17.8	0.00	0.00

Daily maximum and minimum temperatures and rainfall data of July 2006 at the University of Georgia Rhizotron and Turfgrass Facility.

Date	Maximum Temp F	Maximum Temp C	Minimum Temp F	Minimum Temp C	Rainfall (in)	Rainfall (cm)
7/1	96	35.6	67	19.4	0.00	0.00
7/2	97	36.1	66	18.9	0.00	0.00
7/3	98	36.7	70	21.1	0.00	0.00
7/4	98	36.7	73	22.8	0.40	1.02
7/5	94	34.4	72	22.2	0.02	0.05
7/6	81	27.2	67	19.4	0.50	1.27
7/7	83	28.3	65	18.3	0.00	0.00
7/8	86	30.0	62	16.7	0.00	0.00
7/9	87	30.6	60	15.6	0.00	0.00
7/10	93	33.9	70	21.1	0.04	0.10
7/11	94	34.4	68	20.0	0.00	0.00
7/12	93	33.9	70	21.1	0.03	0.08
7/13	93	33.9	75	23.9	0.09	0.23
7/14	97	36.1	72	22.2	0.00	0.00
7/15	98	36.7	73	22.8	0.00	0.00
7/16	97	36.1	73	22.8	0.00	0.00
7/17	98	36.7	70	21.1	0.00	0.00
7/18	98	36.7	68	20.0	0.00	0.00
7/19	99	37.2	70	21.1	0.00	0.00
7/20	97	36.1	70	21.1	Trace	Trace
7/21	99	37.2	69	20.6	Trace	Trace
7/22	92	33.3	70	21.1	1.81	4.60
7/23	85	29.4	70	21.1	0.01	0.03
7/24	82	27.8	70	21.1	0.53	1.35
7/25	88	31.1	71	21.7	0.02	0.05
7/26	94	34.4	69	20.6	0.00	0.00
7/27	96	35.6	70	21.1	0.00	0.00
7/28	98	36.7	70	21.1	0.01	0.03
7/29	89	31.7	72	22.2	0.20	0.51
7/30	92	33.3	71	21.7	0.00	0.00
7/31	97	36.1	73	22.8	0.00	0.00

Daily maximum and minimum temperatures and rainfall data of August 2006 at the University of Georgia Rhizotron and Turfgrass Facility.

Date	Maximum Temp F	Maximum Temp C	Minimum Temp F	Minimum Temp C	Rainfall (in)	Rainfall (cm)
8/1	97	36.1	74	23.3	0.00	0.00
8/2	98	36.7	72	22.2	Trace	Trace
8/3	97	36.1	74	23.3	0.06	0.15
8/4	100	37.8	73	22.8	Trace	Trace
8/5	93	33.9	71	21.7	1.19	3.02
8/6	89	31.7	72	22.2	0.00	0.00
8/7	96	35.6	73	22.8	0.00	0.00
8/8	97	36.1	74	23.3	0.00	0.00
8/9	95	35.0	73	22.8	0.00	0.00
8/10	97	36.1	73	22.8	0.00	0.00
8/11	88	31.1	73	22.8	0.00	0.00
8/12	77	25.0	66	18.9	0.26	0.66
8/13	83	28.3	67	19.4	0.00	0.00
8/14	89	31.7	68	20.0	0.00	0.00
8/15	91	32.8	70	21.1	0.04	0.10
8/16	90	32.2	72	22.2	0.01	0.03
8/17	88	31.1	71	21.7	1.40	3.56
8/18	88	31.1	68	20.0	0.00	0.00
8/19	90	32.2	66	18.9	0.00	0.00
8/20	93	33.9	70	21.1	1.14	2.90
8/21	91	32.8	71	21.7	0.50	1.27
8/22	89	31.7	72	22.2	0.41	1.04
8/23	86	30.0	71	21.7	Trace	Trace
8/24	85	29.4	72	22.2	0.00	0.00
8/25	86	30.0	71	21.7	Trace	Trace
8/26	89	31.7	69	20.6	0.00	0.00
8/27	89	31.7	68	20.0	0.00	0.00
8/28	91	32.8	67	19.4	0.00	0.00
8/29	93	33.9	73	22.8	Trace	Trace
8/30	92	33.3	72	22.2	0.11	0.28
8/31	83	28.3	69	20.6	0.64	1.63

Daily maximum and minimum temperatures and rainfall data of September 2006 at the University of Georgia Rhizotron and Turfgrass Facility.

Date	Maximum Temp F	Maximum Temp C	Minimum Temp F	Minimum Temp C	Rainfall (in)	Rainfall (cm)
9/1	83	28.3	70	21.1	0.00	0.00
9/2	86	30.0	68	20.0	0.00	0.00
9/3	87	30.6	72	22.2	0.00	0.00
9/4	89	31.7	71	21.7	0.01	0.03
9/5	85	29.4	68	20.0	0.13	0.33
9/6	84	28.9	67	19.4	0.06	0.15
9/7	79	26.1	65	18.3	Trace	Trace
9/8	84	28.9	63	17.2	0.00	0.00
9/9	83	28.3	63	17.2	0.00	0.00
9/10	86	30.0	64	17.8	0.00	0.00
9/11	85	29.4	65	18.3	0.00	0.00
9/12	77	25.0	63	17.2	0.08	0.20
9/13	67	19.4	63	17.2	1.19	3.02
9/14	80	26.7	62	16.7	0.00	0.00
9/15	83	28.3	58	14.4	0.00	0.00
9/16	84	28.9	58	14.4	0.00	0.00
9/17	85	29.4	58	14.4	0.00	0.00
9/18	87	30.6	64	17.8	0.13	0.33
9/19	82	27.8	60	15.6	0.00	0.00
9/20	77	25.0	53	11.7	0.00	0.00
9/21	76	24.4	52	11.1	0.00	Trace
9/22	82	27.8	59	15.0	0.00	0.00
9/23	88	31.1	67	19.4	0.00	0.00
9/24	86	30.0	67	19.4	0.51	1.30
9/25	79	26.1	60	15.6	0.00	0.00
9/26	78	25.6	56	13.3	0.00	0.00
9/27	78	25.6	58	14.4	0.00	0.00
9/28	83	28.3	54	12.2	0.11	0.28
9/29	70	21.1	46	7.8	0.00	0.00
9/30	75	23.9	45	7.2	0.00	0.00

Daily maximum and minimum temperatures and rainfall data of October 2006 at the University of Georgia Rhizotron and Turfgrass Facility.

Date	Maximum Temp F	Maximum Temp C	Minimum Temp F	Minimum Temp C	Rainfall (in)	Rainfall (cm)
10/1	84	28.9	53	11.7	0.00	0.00
10/2	82	27.8	58	14.4	0.00	0.00
10/3	82	27.8	60	15.6	0.00	0.00
10/4	84	28.9	58	14.4	0.00	0.00
10/5	87	30.6	59	15.0	0.00	0.00
10/6	82	27.8	58	14.4	0.00	0.00
10/7	72	22.2	48	8.9	0.00	0.00
10/8	68	20.0	53	11.7	0.00	0.00
10/9	77	25.0	59	15.0	0.00	0.00
10/10	80	26.7	54	12.2	0.00	0.00
10/11	82	27.8	60	15.6	0.01	0.03
10/12	74	23.3	51	10.6	0.00	0.00
10/13	65	18.3	41	5.0	0.00	0.00
10/14	70	21.1	35	1.7	0.00	0.00
10/15	70	21.2	35	1.7	0.00	0.00
10/16	61	16.2	47	8.3	0.07	0.18
10/17	68	20.0	55	12.8	0.04	0.10
10/18	81	27.2	61	16.1	0.00	0.00
10/19	75	23.9	60	15.6	0.00	0.00
10/20	70	21.1	44	6.7	0.00	0.00
10/21	68	20.0	40	4.4	0.00	0.00
10/22	68	20.0	50	10.0	0.03	0.08
10/23	54	12.2	33	0.6	0.00	0.00
10/24	57	13.9	31	-0.6	0.00	0.00
10/25	55	12.8	32	0.0	0.00	0.00
10/26	67	19.4	45	7.2	0.00	0.00
10/27	65	18.3	50	10.0	2.02	5.13
10/28	64	17.8	45	7.2	0.00	0.00
10/29	72	22.2	40	4.4	0.00	0.00
10/30	75	23.9	42	5.6	0.00	0.00
10/31	71	21.7	45	7.2	0.00	0.00

Daily maximum and minimum temperatures and rainfall data of November 2006 at the University of Georgia Rhizotron and Turfgrass Facility.

Date	Maximum Temp F	Maximum Temp C	Minimum Temp F	Minimum Temp C	Rainfall (in)	Rainfall (cm)
11/1	77	24.7	48	8.6	0.00	0.00
11/2	66	18.9	40	4.6	0.00	0.00
11/3	57	13.7	32	-0.1	0.00	0.00
11/4	55	12.9	31	-0.6	0.00	0.00
11/5	59	14.7	32	-0.3	0.00	0.00
11/6	58	14.3	44	6.9	0.00	0.00
11/7	53	11.6	47	8.2	0.73	1.85
11/8	62	16.6	51	10.4	0.00	0.00
11/9	77	24.7	47	8.5	0.00	0.00
1110	80	26.5	51	10.4	0.00	0.00
11/11	70	20.9	44	6.7	0.00	0.00
11/12	61	15.9	37	3.0	0.00	0.00
11/13	71	21.4	31	-0.5	0.00	0.00
11/14	70	20.9	41	5.2	0.00	0.00
11/15	61	15.9	51	10.3	2.27	5.77
11/16	62	16.8	44	6.8	0.03	0.08
11/17	56	13.4	42	5.8	0.00	0.00
11/18	61	16.2	35	1.7	0.00	0.00
11/19	56	13.3	36	2.0	0.00	0.00
11/20	47	8.4	37	2.8	0.00	0.00
11/21	52	11.0	35	1.4	0.00	0.00
11/22	65	18.4	41	4.8	0.09	0.23
11/23	69	20.4	37	2.5	0.00	0.00
11/24	68	20.0	41	4.8	0.00	0.00
11/25	68	20.2	41	4.8	0.00	0.00
11/26	69	20.8	37	2.9	0.00	0.00
11/27	70	20.9	37	2.5	0.00	0.00
11/28	63	17.2	53	11.8	0.00	0.00
11/29	70	21.1	56	13.4	0.03	0.08
11/30	76	24.3	61	16.3	0.03	0.08

Daily maximum and minimum temperatures and rainfall data of December 2006 at the University of Georgia Rhizotron and Turfgrass Facility.

Date	Maximum Temp F	Maximum Temp C	Minimum Temp F	Minimum Temp C	Rainfall (in)	Rainfall (cm)
12/1	70	21.0	38	3.2	0.10	0.25
12/2	61	16.2	33	0.3	0.00	0.00
12/3	59	15.0	38	3.1	0.00	0.00
12/4	48	8.7	29	-1.7	0.00	0.00
12/5	58	14.5	28	-2.3	0.00	0.00
12/6	61	16.1	32	-0.1	0.00	0.00
12/7	54	12.4	26	-3.3	0.00	0.00
12/8	42	5.8	18	-7.7	0.00	0.00
12/9	52	11.0	18	-7.6	0.00	0.00
1210	58	14.3	25	-3.9	0.00	0.00
12/11	66	18.9	34	1.1	0.00	0.00
12/12	64	17.8	37	2.8	0.00	0.00
12/13	67	19.4	44	6.7	0.00	0.00
12/14	65	18.3	37	2.8	0.00	0.00
12/15	70	21.1	39	3.9	0.00	0.00