Annual Bluegrass Control in Greens Height Creeping Bentgrass with Split Year Timings

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Introduction

This study was conducted on a mature stand of 'Penncross' creeping bentgrass (*Agrostis stolonifera*) and annual bluegrass (*Poa annua*) at the Valentine Turfgrass Research Center, Penn State University, University Park, PA. The objective of the study was to determine if selected materials could reduce the annual bluegrass population under simulated golf course putting green conditions with applications made in both early and late in the growing season.

Methods and Materials

This study was a randomized complete block design with three replications (Figure 1). Treatments were applied on May 2 (MAY), June 6 (4 WAT), July 1 (8 WAT), September 1 (16 WAT), October 3 (20 WAT), November 3 (24 WAT), and November 17, 2011 (26 WAT) using a three foot CO_2 powered boom sprayer (Figure 2) calibrated to deliver 87.12gpa using one, flat fan, TP9508EVS nozzle at 40 psi. The test area was maintained at 0.125 inch using a Toro triplex reel mower. Additionally, turfgrass was irrigated on an as needed basis to prevent moisture stress. The test area received maintenance fungicide applications to control disease.

The test site consisted of approximately 25 percent creeping bentgrass and 75 percent annual bluegrass at the initiation of the study (Figure 1.). The annual bluegrass population was visually evaluated on April 7, 2011, again on November 1, 2011, and finally on April 12, 2012 on a plot by plot basis, to determine the baseline population and percent change of the population in each plot.

Results and Discussion

Annual bluegrass phytotoxicity was rated five times during the study (Table 1). All treated annual bluegrass revealed some level of phytotoxicity. This would be expected as the objective of the study was to eliminate the weed.

In order to gain some insight to the annual bluegrass population, a November 2011 control rating was taken (Table 2). As would be expected, control was variable. At no time were any voids in the turfgrass canopy recorded. It seems that the annual bluegrass dissipated at a slow rate and the creeping bentgrass filled in any potential voids. On the final (April 12, 2012) rating date, it appeared that the best treatments (significantly different than all others) are those applied more than once in April and applied any number of times in early September (16 WAT).

MRC continues to show promise in the annual bluegrass control arena. There is more research needed to formulate the correct rate and timing to incorporate MRC into a turfgrass management scheme. Finally, the soil texture and amount of precipitation are included in this report for reference (Table 3 and 4 respectively).

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Table 1. Annual bluegrass phytotoxicity on a scale of 0-10, where 0 = dead turf, 7 = acceptable, and 10 = no phytotoxicity in a mixed greens height sward of 'Penncross' creeping bentgrass and annual bluegrass in 2010.

Treatment	Form	Rate	Timing	(----------Poa Phytotoxicity----------				)
		oz/A		5/20	6/15	7/15	9/30	11/1
MRC	EC	55	MAY	7.5	10.0	10.0	9.5	10.0
MRC	EC	55	MAY/4 WAT	8.3	7.3	10.0	9.5	10.0
MRC	EC	55	MAY/4/8 WAT	7.8	7.3	7.0	9.5	10.0
MRC	EC	55	20 WAT	10.0	10.0	10.0	9.5	7.0
CHECK				10.0	10.0	10.0	10.0	10.0
MRC	EC	55	20/24 WAT	10.0	10.0	10.0	9.5	7.0
MRC	EC	55	16 WAT	10.0	10.0	10.0	7.0	10.0
MRC	EC	82	16 WAT	10.0	10.0	10.0	6.3	10.0
MRC	EC	82	20/24/26	10.0	10.0	10.0	9.5	7.0
MRC	EC	110	20 WAT	10.0	10.0	10.0	9.5	7.0
MRC	EC	82	16/20 WAT	10.0	10.0	10.0	6.5	7.0

Table 2. Percent control of annual bluegrass in a mixed greens height sward with 'Penncross' creeping bentgrass in 2011 and 2012.

Treatment	Form	Rate	Timing	(--------% Control[1]--------	)
		oz/A		11/1/11	4/12/12
MRC	EC	55	APR	76.5bc	69.4b
MRC	EC	55	APR/4 WAT	91.1a	80.0a
MRC	EC	55	APR/4/8 WAT	93.6a	86.9a
MRC	EC	55	20 WAT	40.0d	28.7c
CHECK				0.0f	0.0e
MRC	EC	55	20/24 WAT	38.1de	14.3d
MRC	EC	55	16 WAT	81.9b	88.7a
MRC	EC	82	16 WAT	76.2bc	90.5a
MRC	EC	82	20/24/26	30.4e	21.7cd
MRC	EC	110	20 WAT	40.0d	26.6c
MRC	EC	82	16/20 WAT	70.4c	91.0a

1 - Means followed by same letter do not significantly differ (P=0.05, Duncan's New MRT)

Table 3. Soil textural analysis of the 'Penncross' creeping bentgrass/annual bluegrass green test area.

Size Fraction	% by weight
>2 mm	0
1-2 mm	5.4
0.5-1 mm	21.9
0.25-0.5 mm	46.5
0.15-0.25 mm	18.8
0.05-0.15 mm	4.0
Silt	2.5
Clay	0.9

Table 4. Precipitation rate, daily high temperatures, and daily low temperatures for the duration of the study in 2011.

May	Precip. (in.)	Daily High (°C)	Daily Low (°C)	June	Precip. (in.)	Daily High (°C)	Daily Low (°C)
5/2/2011	0.12	12.4	7.8	6/1/2011	0	30.5	15.8
5/3/2011	0	17.7	9.2	6/2/2011	0	28.6	16.6
5/4/2011	0.61	22	4.8	6/3/2011	0	21	8
5/5/2011	0.18	8.2	3.5	6/4/2011	0	21.9	4.6
5/6/2011	0	15.2	0.6	6/5/2011	0.19	21.4	5.1
5/7/2011	0	17.2	0.4	6/6/2011	0	27	11.7
5/8/2011	0	16.2	3.8	6/7/2011	0	25.7	7.9
5/9/2011	0	18.8	2.4	6/8/2011	0	24.9	10.2
5/10/2011	0	18.9	2.4	6/9/2011	0	31.1	12.2
5/11/2011	0	21.7	0.5	6/10/2011	0.02	30.4	17.1
5/12/2011	0	23	7.8	6/11/2011	0.76	26.4	14.5
5/13/2011	0	22.8	9.4	6/12/2011	0.42	25.3	15.9
5/14/2011	0	18.7	13.3	6/13/2011	0.13	24.6	11.6
5/15/2011	0.01	14.1	12.8	6/14/2011	0	19.2	8.6
5/16/2011	0.67	17.7	12.4	6/15/2011	0	18.3	7.1
5/17/2011	0.01	16.1	8.8	6/16/2011	0	23.5	4.1
5/18/2011	0.45	14.5	8.6	6/17/2011	0.42	18.9	11
5/19/2011	0.76	16.1	10.7	6/18/2011	0	22.4	11.8
5/20/2011	0.25	15.8	8.4	6/19/2011	0	25.5	12.8
5/21/2011	0.28	19.2	10	6/20/2011	0	25.3	12.7
5/22/2011	0.01	23.1	7.1	6/21/2011	0.44	23.8	15.7
5/23/2011	0	X	X	6/22/2011	0.08	27.1	16.7
5/24/2011	0.48	23	14.3	6/23/2011	0.01	26.7	19.2
5/25/2011	0	22	13.7	6/24/2011	0.08	24.9	16.3
5/26/2011	0	24.9	11.1	6/25/2011	0.06	20.9	14.8
5/27/2011	0.18	27.8	15.5	6/26/2011	0	18.6	11.4
5/28/2011	0.76	22.8	14.7	6/27/2011	0	19.5	11.4
5/29/2011	0.02	24.4	14.3	6/28/2011	0	22.5	9.1
5/30/2011	0	27.9	18.2	6/29/2011	0	27.1	16.5
5/31/2011	0	30.2	17.4	6/30/2011	0	22.8	11.4

Table 4 cont. Precipitation rate, daily high temperatures, and daily low temperatures for the duration of the study in 2011.

July	Precip. (in.)	Daily High (°C)	Daily Low (°C)	August	Precip. (in.)	Daily High (°C)	Daily Low (°C)	September	Precip. (in.)	Daily High (°C)	Daily Low (°C)
7/1/2011	0	23.8	8	8/1/2011	0	28.7	11.7	9/1/2011	0	23.5	8
7/2/2011	0	26.1	7.2	8/2/2011	0.12	29.1	14.3	9/2/2011	0.07	23.3	14.1
7/3/2011	0	27.8	7.4	8/3/2011	0.01	28.4	13.8	9/3/2011	0	20.9	17.9
7/4/2011	0	27.6	16.2	8/4/2011	0.45	22.1	17.6	9/4/2011	0	29	18.8
7/5/2011	0	25.5	13.1	8/5/2011	0	25.2	18.6	9/5/2011	0.47	27.4	18.2
7/6/2011	0	28	13.1	8/6/2011	0	23.7	17.4	9/6/2011	0.78	19.3	12.1
7/7/2011	0	30.2	11.1	8/7/2011	0.42	23.8	17.7	9/7/2011	1.23	13.2	11.8
7/8/2011	0	28.4	14.1	8/8/2011	0.05	27.2	17.9	9/8/2011	1.96	15.3	12.1
7/9/2011	0.01	21.9	16.4	8/9/2011	0	27.3	16.1	9/9/2011	0.4	20.1	14.6
7/10/2011	0	28.4	12.2	8/10/2011	0.18	25.1	15.3	9/10/2011	0.05	22.4	16.3
7/11/2011	0	28.8	10.8	8/11/2011	0	24.1	12.7	9/11/2011	0.11	22.6	14.5
7/12/2011	0	30.7	14.2	8/12/2011	0	22.9	8.6	9/12/2011	0.01	21.2	11.9
7/13/2011	0	29.6	18.3	8/13/2011	0	24.6	6.4	9/13/2011	0.01	22.7	9.5
7/14/2011	0	26.6	12.9	8/14/2011	0.07	22.4	10.9	9/14/2011	0	25.2	10.1
7/15/2011	0	26.6	7.8	8/15/2011	1.33	24.2	14.4	9/15/2011	0.11	23.9	12.8
7/16/2011	0	26.3	9.8	8/16/2011	0.29	20.8	14.3	9/16/2011	0.35	15.7	2.8
7/17/2011	0	27.6	9.6	8/17/2011	0	26.3	12.4	9/17/2011	0	13.9	1.5
7/18/2011	0	30.1	13.8	8/18/2011	0	26.3	9.6	9/18/2011	0	14.2	5.7
7/19/2011	0	31	15.2	8/19/2011	0	26.4	13.7	9/19/2011	0	16.6	2.9
7/20/2011	0.3	31	20.2	8/20/2011	0.2	25.4	12.2	9/20/2011	0.22	16	5.3
7/21/2011	0	33.1	16.9	8/21/2011	0	26.1	12.4	9/21/2011	0.08	20.2	12.4
7/22/2011	0	34.9	16.6	8/22/2011	0.47	24.9	15.3	9/22/2011	0.01	20.8	13.7
7/23/2011	0	36.9	23.2	8/23/2011	0	21.1	8.8	9/23/2011	0	22.2	12.9
7/24/2011	0	32	19.8	8/24/2011	0	22.9	6	9/24/2011	0.24	18.8	12.6
7/25/2011	0	31	20	8/25/2011	0	23.9	12.8	9/25/2011	0	20.6	11.5
7/26/2011	1.03	26.1	17.7	8/26/2011	0.37	25.2	13.7	9/26/2011	0	22.4	13.9
7/27/2011	0.13	27.7	13.7	8/27/2011	0.01	25.5	11.2	9/27/2011	0	23.9	17.6
7/28/2011	0	27.1	10.6	8/28/2011	0.2	23.5	14.1	9/28/2011	1.04	20	16.1
7/29/2011	0.77	21.7	16	8/29/2011	0.65	21.6	8	9/29/2011	0.54	20.6	14
7/30/2011	0	30.6	18	8/30/2011	0	21.1	5.6	9/30/2011	0.07	16.9	9.2
7/31/2011	0	29.3	14.8	8/31/2011	0	24.3	5.4				

Table 4 cont. Precipitation rate, daily high temperatures, and daily low temperatures for the duration of the study in 2011.

October	Precip. (in.)	Daily High (°C)	Daily Low (°C)	November	Precip. (in.)	Daily High (°C)	Daily Low (°C)
10/1/2011	0.01	13.7	7.4	11/1/2011	0	5.5	-5.8
10/2/2011	0.4	7.4	3.3	11/2/2011	0	11	-4.5
10/3/2011	0.74	6	-0.3	11/3/2011	0	12.9	-5.1
10/4/2011	0.07	10.9	2.8	11/4/2011	0	15.1	-2.1
10/5/2011	0	13.9	4.6	11/5/2011	0	8.4	-2.7
10/6/2011	0.01	19.4	4.4	11/6/2011	0	8.1	-7.1
10/7/2011	0	17.9	-1.6	11/7/2011	0	10.6	-1.3
10/8/2011	0	19.9	1.2	11/8/2011	0	17	-5.5
10/9/2011	0	21.9	2.1	11/9/2011	0	18.5	-1.3
10/10/2011	0	24.8	4.1	11/10/2011	0	16.2	-1.6
10/11/2011	0	22	4.5	11/11/2011	0.05	10.4	-1
10/12/2011	0	19.1	5.5	11/12/2011	0	3.5	-3.4
10/13/2011	0.54	15.9	9.6	11/13/2011	0	13.3	-2.9
10/14/2011	0.29	15.8	10.1	11/14/2011	0	15.1	5.2
10/15/2011	0.28	15.9	6.1	11/15/2011	0.09	18.3	10.2
10/16/2011	0	12.5	7.3	11/16/2011	0.21	12	7.5
10/17/2011	0.18	16.3	6.2	11/17/2011	0.23	10.5	3.8
10/18/2011	0.01	15.3	3.9	11/18/2011	0	3.8	-3.1
10/19/2011	0	18.9	8				
10/20/2011	0.92	16.1	9.8				
10/21/2011	0.04	9.8	5				
10/22/2011	0	6.8	3.6				
10/23/2011	0	9.8	-0.6				
10/24/2011	0	13.2	-3.5				
10/25/2011	0.05	14.5	2.6				
10/26/2011	0	14.3	2.6				
10/27/2011	0	15.6	1.9				
10/28/2011	0.4	13.8	-1.3				
10/29/2011	0	4.4	-4.2				
10/30/2011	0.43	1.3	-6.1				
10/31/2011	0.21	5.4	-8.9				

Figure 1: Overview of testing area. Photo taken 4 WAA on June 7, 2011.

Figure 2: CO_2 powered boom sprayer used for application of liquid materials.