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The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State University of New Jersey in cooperation with the New Jersey Turfgrass Association. The purpose of this document is to provide a forum for the dissemination of information and the exchange of ideas and knowledge. The proceedings provide turfgrass managers, research scientists, extension specialists, and industry personnel with opportunities to communicate with co-workers. Through this forum, these professionals also reach a more general audience, which includes the public.

This publication includes lecture notes of papers presented at the 2018 GREEN EXPO Turf and Landscape Conference. Publication of these lectures provides a readily available source of information covering a wide range of topics and includes technical and popular presentations of importance to the turfgrass industry.

This proceedings also includes research papers that contain original research findings and reviews of selected subjects in turfgrass science. These papers are presented primarily to facilitate the timely dissemination of original turfgrass research for use by the turfgrass industry.

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Dr. Ann Brooks Gould, Editor
Dr. Bruce B. Clarke, Coordinator

RESPONSE OF KENTUCKY BLUEGRASS TO TRAFFIC IN AUTUMN, 2018

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Kentucky bluegrass (*Poa pratensis* L.) is among the most frequently established cool-season turfgrasses on sports fields and other highly trafficked recreational surfaces in New Jersey and throughout temperate climates in the United States. Researchers have used machines to evaluate turfgrass (including Kentucky bluegrass) responses to wear or the combined stresses of wear and compaction (traffic).

The Rutgers Wear Simulator (RWS; Bonos et al., 2001) was designed to primarily affect aboveground plant parts such as leaves, stems, and shoots and cause minimal soil compaction. Traffic simulators have been designed to generate both wear and soil compaction similar to those stresses resulting from sports field play with cleated shoes including the Cady Traffic Simulator (CTS; Henderson et al., 2005). Research has been conducted by the Rutgers Center for Turfgrass Science comparing how the RWS and CTS, operated independent of one another, affect turfgrass (Park et al., 2013; Park et al., 2014; Park et al., 2016a).

Tall fescue (*Schedonorus arundinaceus* [Schreb.] Dumort.) entry tolerance to traffic in the 2012 National Turfgrass Evaluation Program (NTEP) Tall Fescue Test was evaluated using both the RWS and CTS operated in a single strip across plots (Park et al., 2015; Park et al., 2016b; Park et al., 2018). Traffic has not yet been imparted on Kentucky bluegrass using a combination of the RWS and CTS.

The objective of this study was to assess the traffic tolerance of Kentucky bluegrass entries in the 2017 NTEP Kentucky bluegrass Test using a combination of the RWS and CTS.

MATERIALS AND METHODS

Evaluation Trial

Eighty-nine (89) entries comprising the 2017 NTEP Kentucky bluegrass trial were seeded at 2.2 lb seed per 1000 ft^2 into 8 x 6-ft plots on 18 September 2017 on a well-drained Nixon loam (sand = 44%; silt = 41%; clay = 15%) at Rutgers Horticutural Research Farm II in North Brunswick, NJ. An unknown Kentucky bluegrass entry was also included in the evaluation. Entries were replicated three times.

Soil test results from September 2017 indicated that the soil pH was 5.9; soil phosphorous and soil potassium were 244 and 271 lb per acre, respectively. Calcitic lime was applied to the test area at 10 lb per 1000 ft^2 in December 2017. The test was mowed approximately 2 times per week with a reel mower at a height of 1.5-inch. The test was irrigated as necessary to avoid drought stress.

A complete fertilizer (16-4-8) was applied at seeding (0.6 lb nitrogen [N] per 1000 ft^2) and again at 0.5, 0.6, and 0.6 lb N per 1000 ft^2 on 20 and 28 October and 17 November 2017, respectively. A total of 4.2 lb N per 1000 ft^2 was applied to the trial in 2018 (0.7, 1.0, 0.6, 0.5, and 0.7, and 0.7 lb N per 1000 ft^2 on 13 April, 26 April, 18 May, 30 May, 5 July, and 24 October 2018, respectively).

Pest Management During 2018

Pests were managed preventively so that Kentucky bluegrass entry responses to traffic were not confused with potential entry responses to pests, particularly diseases and insects. Crabgrass (*Digitaria* spp.) was controlled preemergence using di-

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thiopyr; white grubs were controlled preventively using clothianidin; and summer patch disease (caused by *Magnaporthiopsis poae*) was preventively managed using azoxystrobin + difenoconazole and pyraclostrobin.

Traffic Application in Autumn 2018

Traffic was applied in a single strip across Kentucky bluegrass entries using a combination of the RWS and CTS. Four passes per week of the RWS and 4 passes per week of the CTS were applied for 4 weeks (32 total machine passes) during 26 September to 17 October 2018.

Traffic was applied to approximately one-half of each plot. The other approximate one-half of each plot did not receive traffic. The RWS was operated at a ground speed of 2.5 miles per hour (mph) and 250 rpm for the paddles; the CTS was operated in the forward direction at a speed of 1.0 mph. Subsequent machine passes were made in the opposite direction.

Evaluation of Trafficked Strips

Trafficked and non-trafficked portions of each plot were evaluated at the conclusion of autumn-applied traffic in 2018. Uniformity of turf cover was visually evaluated using a 1 to 9 scale where 9 equaled the most uniform turf cover. Plots were also evaluated for fullness of turf canopy (FTC) using a 0 to 100% scale where 100% equaled a full canopy.

A Canon PowerShot G16 (Canon USA, Inc., Lake Success, NY) digital camera was positioned to capture images of plots within an enclosed box equipped with artificial lighting. Individual digital image size was 3000 x 4000 pixels and camera settings included a shutter speed of 1/40 s, aperture of F2.8, ISO of 100, and a focal length of 8 mm. Images were imported into TurfAnalyzer (Green Research Services, LLC, Fayetteville, AR) for digital image analysis (DIA). Green cover (0 to 100% scale; 100% = complete green cover) was identified in the images using a hue range of 50 to 107 and a saturation range of 0 to 100.

Data were analyzed using a 2 x 90 factorial of traffic and entries arranged in a strip-plot design. Horizontal strips were trafficked and non-trafficked treatments. Vertical strips were the 90 Kentucky bluegrass entries. Data were subjected to analysis of variance and means were separated using the Fisher's protected least significant difference (LSD) test at $p \leq 0.05$.

Evaluation of Non-Trafficked Plots

Visual turf quality in the absence of traffic (i.e., overall appearance, turf color, uniformity, density, mowing quality, reduced rate of vertical growth, leaf texture, and freedom from insect and/or disease damage) was rated from May through October 2018 using a 1 to 9 scale, where 9 equaled the best turf quality.

Spring green-up was visually rated on 6 April 2018; seedhead development was evaluated on 18 May 2018; and genetic color was assessed on 27 June 2018. A 1 to 9 scale was utilized for these ratings, where 9 equaled the best spring green-up, least seedheads, and darkest green color.

Leaf spot disease (caused by *Drechslera* spp.) was observed during spring and was visually evaluated on 18 May 2018 using a 1 to 9 scale where 9 equaled least visible diseased-induced damage.

These data were analyzed as a single factor randomized complete block design and means were separated using the Fisher's protected least significant difference (LSD) test at $p \leq 0.05$.

RESULTS

Response to Traffic During Autumn 2018

Kentucky bluegrass had poorer uniformity of turf cover and lower FTC and green cover in traffic plots compared to no-traffic plots during autumn 2018 (Table 1). Performance of entries for each parameter depended on the level of traffic.

Entries with the best uniformity of turf cover after autumn traffic were Barvette HGT, Prosperity, PST-K15-172, J-1138, NAI-A16-3, BAR PP 7K426, NAI-14-178, After Midnight, A-16-17, BAR PP 71213, PST-K15-167, DLFPS-340/3549, and A11-38 (Table 2). Among these entries, the uniformity of turf cover of Barvette HGT was unaffected by traffic. Entries with the poorest uniformity of turf cover after traffic were NAI-14-122, NAI-14-133, NAI-14-187, NAI-14-132, and NAI-15-80.

Entries with the highest FTC after autumn traffic were Barvette HGT, Prosperity, PST-K15-172,

J-1138, BAR PP 7K426, NAI-A16-3, and BAR PP 71213 (Table 2). Entries with the lowest FTC after traffic were NAI-14-132, NAI-14-187, and NAI-15-80.

Entries with the highest green cover after traffic were NAI-14-178, After Midnight, A-16-17, PPG-KB 1131, NAI-13-132, NAI-13-14, PST-11-7, Barvette HGT, BAR PP 79494, Prosperity, A11-26, DLFPS-340/3500, DLFPS-340/3494, BAR PP 71213, Blue Devil, PST-K15-172, PST-K15-167, J-1138, DLFPS-340/3556, NAI-13-9, NAI-A16-3, BAR PP 7K426, J-3510, DLFPS-340/3548, and Midnight (Table 2). Among these entries, DIA determined that the green cover of the following entries was unaffected by traffic: NAI-14-178, After Midnight, PPG-KB 1131, NAI-13-132, NAI-13-14, PST-11-7, Barvette HGT, BAR PP 79494, and Prosperity. Entries with the lowest green cover after traffic were NAI-14-176 NK-1, NAI-14-133, NAI-14-132, and NAI-15-80.

Performance of Kentucky Bluegrass Without Traffic Stress

Sixty-two (62) Kentucky bluegrass entries exhibited minimally acceptable (≥ 6.0) average turf quality during 2018 (Table 3); entries with the best average turf quality were GO-22B23, NAI-A16-3, A11-26, GO-2628, J-1138, GO-2425, J-2726, After Midnight, Prosperity, and KH3492. Additional entries that exhibited very good turf average turf quality (≥ 7.0) during 2018 were PST-K15-167, Orion (PST-K13-143), J-3510, BAR PP 71213, PPG-KB 1131, PST-K15-172, BAR PP 79494, NAI-13-132, PST-K11-118, PST-11-7, NAI-13-14, Blue Devil, DLFPS-340/3549, PST-K13-139, Barserati (BAR PP 110358), A11-38, Skye, Babe, Barvette HGT, BAR PP 7236V, J-1319, BAP PP 79366, NAI-14-178, and DLFPS-340/3494.

Entries with the poorest average turf quality during 2018 were Kenblue, DLFPS-340/3364, and NAI-15-80 (Table 3). Other entries exhibiting poor average turf quality (≤ 5.0) during 2018 were PST-K13-141, A10-280, MVS-130, NAI-15-84, PST-K15-157, A16-7, NAI-14-176, NAI-14-187, NAI-14-132, NAI-14-122, NAI-14-133, and NK-1.

Entries with the best spring green-up on 6 April 2018 included the unknown cultivar/experimental selection, Kenblue, and DLFPS-340/3455 (Table 4). Entries exhibiting the poorest spring green-up on the same rating date were After Midnight, A13-1, NAI-14-176, NAI-14-122, DLFPS-340/3364, J-2726, BAR PP 71213, J-3510, AKB3179, NAI-14-132, PST-K15-167, PST-K15-172, BAR PP 79494, DLFPS-340/3549, BAP PP 79366, A11-26, PPG-KB 1320, and Blue Knight.

Entries exhibiting the fewest seedheads on 18 May 2018 were the unknown cultivar/experimental selection, DLFPS-340/3455, Barvette HGT, DLFPS-340/3550, BAR PP 7236V, LTP-11-41, Midnight, NAI-13-9, J-1138, NAI-13-14, PPG-KB 1320, DLFPS-340/3553, DLFPS-340/3556, PPG-KB 1131, NAI-13-132, Selway, A-16-17, After Midnight, J-2726, J-3510, BAR PP 79494, A11-26, Kenblue, Prosperity, Pivot, RAD 553, NAI-14-178, J-1319, BAP PP 79366, RAD-1776, PPG-KB 1304, DLFPS-340/3548, A13-1, DLFPS-340/3549, and Blue Knight (Table 4). Entries with the most seedheads on this rating date were PST-K15-177, AKB3241, DLFPS-340/3494.

Most Kentucky bluegrass entries were largely unaffected by leaf spot disease on 18 May 2018; eighty-two entries had the least observed disease (Table 4). Entries with the greatest disease were the unknown cultivar/experimental selection, RAD-1776, and Kenblue.

The following entries had the darkest green color on 27 June 2018: After Midnight, J-1319, Prosperity, NAI-14-132, NAI-13-132, BAR PP 79494, Midnight, PST-K15-157, J-1138, NAI-13-14, PPG-KB 1131, J-3510, NAI-14-128, NAI-14-176, MVS-130, NAI-14-187, Blue Knight, DLFPS-340/3550, NAI-14-122, PST-K15-177, and NAI-13-9 (Table 4). Entries with the lightest green color were BAR PP 7236V, Kenblue, DLFPS-340/3549, A-16-17, and BAR PP 71213.

DISCUSSION

National Turfgrass Evaluation Program tests continue to be an excellent resource for non-biased data concerning the performance of commercially available turfgrass cultivars and experimental selections. Our research focuses principally on traffic tolerance and turfgrass quality, two selection criteria important for those managing high traffic sports fields and grounds or sod growers servicing this market.

These data are also important for the turfgrass seed industry. Of the 89 entries comprising the

2017 NTEP Kentucky bluegrass test, only 15 entries are commercially available as of the printing of these Proceedings in July 2019. Seed company decision-makers can use these data to help determine whether to commercialize their experimental selections.

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Table 1. Uniformity of turf cover, fullness of turfgrass canopy, and green cover as affected by traffic and Kentucky bluegrass entry during autumn 2018.

	Autumn Traffic[1]		
	Uniformity of Turf Cover[2]	Fullness of Turfgrass Canopy[3]	Green Cover[4]
	1 to 9 scale	0 to 100% scale	
Level of Traffic			
No Traffic	8.7	91.5	91.2
Traffic	5.3	55.9	60.4
Source of Variation			
Traffic	***	***	***
Entry	***	***	**
Traffic x Entry	***	***	***
CV (%)	10.4	9.2	7.3

[1] Thirty-two machine passes were applied during autumn 2018 using the Rutgers Wear Simulator (RWS) and Cady Traffic Simulator (CTS) during a 4-week traffic period (four passes per week using the RWS and four passes per week using the CTS during 26 September to 17 October 2018)
[2] 9 = most dense, uniform canopy
[3] 100% = full canopy
[4] 100% = complete green cover; measured by digital image analysis
,* = Significant at the 0.01 and 0.001 probability level

Table 2. Uniformity of turf cover, fullness of turfgrass canopy, and green cover as affected by the interaction of Kentucky bluegrass entry and traffic during autumn 2018. (Includes all entries of the 2017 National Turfgrass Evaluation Program (NTEP) Kentucky bluegrass Test.)

		Autumn Traffic[1]					
		Uniformity of Turf Cover[2]		Fullness of Turfgrass Canopy[3]		Green Cover[4]	
	Kentucky Bluegrass Entry	No Traffic	Traffic	No Traffic	Traffic	No Traffic	Traffic
		1 to 9 scale		0 to 100% scale			
1	Barvette HGT	9.0	8.3	100.0	83.3	91.7	80.9
2	Prosperity	9.0	7.7	95.0	75.0	88.5	80.1
3	PST-K15-172	8.7	7.7	91.7	75.0	90.2	77.7
4	J-1138	9.0	7.3	93.3	75.0	91.6	77.1
5	BAR PP 7K426	9.0	7.3	96.7	75.0	92.9	76.1
6	NAI-A16-3	9.0	7.3	96.7	73.3	93.7	76.4
7	BAR PP 71213	8.7	7.0	95.0	71.7	93.0	78.8
8	NAI-14-178	9.0	7.0	98.3	70.0	94.6	84.9
9	A-16-17	9.0	7.0	93.3	70.0	95.4	83.6
10	PST-K15-167	9.0	7.0	96.7	70.0	90.3	77.4
11	A11-38	9.0	7.0	96.7	70.0	92.8	70.1
12	After Midnight	9.0	7.0	95.0	68.3	82.6	83.8
13	DLFPS-340/3549	9.0	7.0	100.0	65.0	94.0	71.4
14	DLFPS-340/3552	9.0	6.7	98.3	70.0	88.3	64.1
15	DLFPS-340/3494	9.0	6.7	93.3	68.3	92.6	78.8
16	PPG-KB 1131	8.7	6.7	91.7	66.7	91.4	82.7
17	A11-26	9.0	6.7	95.0	66.7	92.3	79.9
18	DLFPS-340/3500	9.0	6.7	91.7	65.0	94.0	79.4
19	RAD 553	9.0	6.7	95.0	65.0	91.6	68.9
20	PST-11-7	9.0	6.3	98.3	68.3	89.6	80.9
21	DLFPS-340/3455	9.0	6.3	91.7	68.3	93.2	72.7
22	Midnight	9.0	6.3	91.7	66.7	91.9	75.0
23	BAR PP 7309V	8.7	6.3	88.3	66.7	92.6	74.8
24	NAI-13-14	9.0	6.3	93.3	65.0	92.7	81.5
25	BAR PP 79494	9.0	6.3	93.3	65.0	92.2	80.7
26	Blue Devil	9.0	6.3	91.7	65.0	91.3	78.8
27	DLFPS-340/3556	9.0	6.3	93.3	65.0	92.6	76.7
28	DLFPS-340/3548	9.0	6.3	93.3	65.0	88.7	75.0
29	KH3492	9.0	6.3	93.3	63.3	94.2	74.2
30	DLFPS-340/3550	9.0	6.3	98.3	63.3	92.9	72.1

(Continued)

Table 2. Kentucky bluegrass traffic test, autumn 2018 (NTEP) (continued).

		Autumn Traffic[1]					
		Uniformity of Turf Cover[2]		Fullness of Turfgrass Canopy[3]		Green Cover[4]	
	Selection	No Traffic	Traffic	No Traffic	Traffic	No Traffic	Traffic
		1 to 9 scale		0 to 100% scale			
31	GO-22B23	9.0	6.3	96.7	63.3	92.0	71.9
32	Yellowstone (A12-7)	9.0	6.3	95.0	61.7	91.4	71.6
33	NAI-13-9	9.0	6.3	90.0	60.0	90.6	76.5
34	BAP PP 79366	9.0	6.3	95.0	60.0	93.1	72.2
35	J-2726	9.0	6.0	98.3	65.0	87.1	71.9
36	LTP-11-41	9.0	6.0	95.0	58.3	92.9	66.1
37	A-15-6	8.3	5.7	85.0	63.3	91.9	71.1
38	PST-K15-177	9.0	5.7	91.7	61.7	86.3	70.2
39	Selway	9.0	5.7	98.3	60.0	92.8	73.0
40	PST-T14-39	8.7	5.7	93.3	60.0	90.7	63.0
41	J-3510	9.0	5.7	98.3	58.3	92.4	75.9
42	GO-2425	9.0	5.7	91.7	58.3	91.6	70.5
43	Babe	9.0	5.7	96.7	58.3	92.7	68.7
44	A-16-2	8.7	5.7	93.3	55.0	93.2	61.4
45	Shamrock	9.0	5.7	91.7	53.3	91.9	61.9
46	NAI-13-132	8.7	5.3	90.0	60.0	92.1	82.2
47	Barserati (BAR PP 110358)	9.0	5.3	95.0	58.3	94.1	64.2
48	Blue Knight	9.0	5.3	90.0	58.3	88.2	57.3
49	PST-K13-139	9.0	5.3	90.0	56.7	92.6	71.1
50	AKB3179	9.0	5.3	96.7	56.7	87.3	47.4
51	PPG-KB 1304	9.0	5.3	91.7	53.3	90.5	70.4
52	A16-1	8.7	5.3	88.3	53.3	92.0	58.5
53	A16-7	8.3	5.3	86.7	51.7	92.8	63.1
54	BAR PP 7236V	9.0	5.0	96.7	56.7	91.9	68.7
55	AKB3128	9.0	5.0	93.3	55.0	90.5	57.3
56	Skye	8.7	5.0	91.7	53.3	89.1	60.7
57	PST-K13-141	8.7	5.0	90.0	53.3	90.7	57.0
58	DLFPS-340/3446	8.7	5.0	90.0	51.7	87.3	47.0
59	PST-K11-118	9.0	5.0	91.7	50.0	95.7	65.8
60	Orion (PST-K13-143)	9.0	5.0	95.0	50.0	90.1	57.2
61	A13-1	8.7	5.0	88.3	46.7	92.8	64.8
62	DLFPS-340/3444	8.0	4.7	85.0	53.3	93.3	61.9
63	GO-2628	9.0	4.7	95.0	51.7	90.8	61.6
64	MVS-130	8.7	4.7	88.3	51.7	80.5	43.8
65	DLFPS-340/3551	8.7	4.7	88.3	46.7	93.7	58.9

(Continued)

Table 2. Kentucky bluegrass traffic test, autumn 2018 (NTEP) (continued).

		Autumn Traffic[1]					
		Uniformity of Turf Cover[2]		Fullness of Turfgrass Canopy[3]		Green Cover[4]	
	Selection	No Traffic	Traffic	No Traffic	Traffic	No Traffic	Traffic
		1 to 9 scale		0 to 100% scale			
66	J-1319	8.3	4.3	90.0	50.0	84.4	55.0
67	Unknown	8.7	4.3	90.0	48.3	92.2	65.2
68	A10-280	8.3	4.3	90.0	48.3	89.9	57.1
69	AKB3241	8.7	4.3	90.0	48.3	93.4	53.3
70	A99-2897	8.3	4.3	86.7	46.7	90.3	64.4
71	A06-8	8.7	4.3	86.7	45.0	90.9	57.5
72	DLFPS-340/3438	8.7	4.3	86.7	45.0	87.8	56.1
73	A11-40	9.0	4.3	95.0	43.3	95.7	64.5
74	NAI-14-128	8.7	4.0	85.0	46.7	82.4	47.7
75	NK-1	8.0	4.0	83.3	45.0	83.3	37.8
76	PPG-KB 1320	8.7	3.7	91.7	43.3	86.4	54.7
77	Pivot	8.7	3.7	88.3	43.3	87.4	52.5
78	A12-34	8.0	3.7	81.7	40.0	86.7	49.3
79	Kenblue	8.7	3.3	88.3	41.7	89.6	49.9
80	RAD-1776	9.0	3.3	90.0	38.3	90.5	45.8
81	PST-K15-157	8.0	3.3	85.0	38.3	91.4	41.3
82	NAI-15-84	8.0	3.0	80.0	36.7	90.6	56.2
83	DLFPS-340/3364	7.0	3.0	75.0	35.0	83.5	44.4
84	NAI-14-176	8.0	3.0	88.3	35.0	77.2	38.1
85	DLFPS-340/3553	8.7	3.0	95.0	33.3	93.8	53.2
86	NAI-14-133	7.3	2.7	81.7	36.7	76.8	36.8
87	NAI-14-122	8.3	2.7	88.3	35.0	79.5	43.6
88	NAI-14-187	8.3	2.3	85.0	30.0	80.1	39.3
89	NAI-14-132	9.0	2.0	91.7	31.7	78.8	35.2
90	NAI-15-80	6.7	1.3	68.3	20.0	91.6	29.3
	Columns (down) LSD at 5% =	1.4		13.1		9.9	
	Rows (across) LSD at 5% =	1.2		11.2		11.5	

[1]Thirty-two machine passes were applied during autumn 2018 using the Rutgers Wear Simulator (RWS) and Cady Traffic Simulator (CTS) during a 4-week traffic period (four passes per week using the RWS and four passes per week using the CTS during 26 September to 17 October 2018)
[2]9 = most dense, uniform canopy
[3]100% = full canopy
[4]100% = complete green cover; measured by digital image analysis

Table 3. Turfgrass quality of Kentucky bluegrass entries without traffic in a turf trial seeded in September 2017 at North Brunswick, NJ. (Includes all entries of the 2017 National Turfgrass Evaluation Program (NTEP) Kentucky Bluegrass Test.)

		Turfgrass Quality (2018)[1]						
	Kentucky Bluegrass Entry	2018 Avg.	May	June	July	Aug.	Sept.	Oct.
1	Barvette HGT	7.1	5.7	6.7	6.7	7.0	7.3	8.0
2	Prosperity	7.8	4.3	8.3	7.7	8.7	8.7	7.7
3	PST-K15-172	7.6	6.0	7.0	7.7	7.7	8.3	6.7
4	J-1138	8.1	5.3	8.3	8.7	8.3	8.7	7.0
5	BAR PP 7K426	6.3	6.7	6.3	5.7	5.0	5.3	5.0
6	NAI-A16-3	8.6	7.7	8.3	8.7	8.7	9.0	8.7
7	BAR PP 71213	7.6	7.0	7.0	7.7	7.3	7.7	7.3
8	NAI-14-178	7.0	3.7	6.3	7.3	7.7	8.0	7.7
9	A-16-17	6.2	6.7	6.0	5.3	5.0	5.3	6.7
10	PST-K15-167	7.7	6.0	7.0	8.3	8.0	7.7	7.0
11	A11-38	7.2	7.0	5.7	6.3	7.3	7.7	6.7
12	After Midnight	7.8	5.3	8.0	8.0	7.7	9.0	9.0
13	DLFPS-340/3549	7.3	8.0	7.0	6.3	6.0	7.3	7.3
14	DLFPS-340/3552	6.6	6.0	7.0	7.0	5.3	5.3	5.7
15	DLFPS-340/3494	7.0	6.3	7.3	6.0	6.3	7.0	6.7
16	PPG-KB 1131	7.6	5.0	8.0	8.0	8.0	7.7	7.7
17	A11-26	8.4	8.3	9.0	7.3	8.0	8.7	8.3
18	DLFPS-340/3500	6.6	4.0	6.7	6.3	6.0	7.3	7.3
19	RAD 553	6.0	7.3	6.7	4.0	4.7	4.3	5.0
20	PST-11-7	7.4	6.3	6.0	7.7	7.0	8.3	8.7
21	DLFPS-340/3455	5.4	5.7	4.7	3.7	4.7	4.7	5.0
22	Midnight	6.9	3.7	6.7	7.7	7.3	7.0	7.7
23	BAR PP 7309V	5.6	6.7	5.7	4.3	4.0	4.3	5.0
24	NAI-13-14	7.3	4.3	8.0	7.7	7.7	7.3	6.0
25	BAR PP 79494	7.5	4.7	7.7	8.0	7.7	8.0	7.7

(Continued)

Table 3. Kentucky bluegrass turf trial without traffic, 2017 (NTEP) (continued).

	Kentucky Bluegrass Entry	Turfgrass Quality (2018)[1] 2018 Avg.	May	June	July	Aug.	Sept.	Oct.
26	Blue Devil	7.3	5.7	7.0	7.7	6.7	8.0	7.0
27	DLFPS-340/3556	6.8	5.3	7.3	6.3	5.3	7.3	5.3
28	DLFPS-340/3548	6.7	5.7	6.3	6.3	6.3	6.7	5.0
29	KH3492	7.7	7.7	7.3	7.3	7.7	7.3	7.3
30	DLFPS-340/3550	6.7	4.0	6.3	6.7	7.0	7.3	7.0
31	GO-22B23	8.6	8.7	8.7	8.7	8.3	8.3	7.7
32	Yellowstone (A12-7)	6.4	6.0	6.3	5.3	5.7	6.0	6.3
33	NAI-13-9	6.8	3.3	7.3	7.0	7.0	7.3	7.0
34	BAP PP 79366	7.0	5.7	6.7	6.7	7.0	7.0	6.7
35	J-2726	7.9	6.7	8.3	7.0	8.0	8.7	7.7
36	LTP-11-41	6.8	6.3	5.3	7.0	6.7	6.7	7.3
37	A-15-6	5.7	4.7	5.0	5.3	5.3	5.3	6.3
38	PST-K15-177	6.9	4.0	7.0	7.7	7.3	6.3	6.7
39	Selway	6.6	6.7	7.0	6.3	5.3	5.3	7.0
40	PST-T14-39	6.8	7.3	6.7	6.3	5.7	6.0	6.3
41	J-3510	7.6	4.7	7.7	8.0	8.0	8.0	7.0
42	GO-2425	8.1	8.3	7.7	7.7	7.3	8.3	7.0
43	Babe	7.1	7.3	7.3	6.0	6.0	6.7	7.0
44	A-16-2	6.8	6.0	6.7	6.7	6.3	6.7	6.3
45	Shamrock	6.6	6.7	6.0	5.3	5.7	6.7	5.7
46	NAI-13-132	7.5	4.0	7.7	8.3	8.0	8.3	7.3
47	Barserati (BAR PP 110358)	7.2	6.7	7.3	6.7	6.3	7.0	6.7
48	Blue Knight	5.2	4.0	6.3	3.3	4.3	4.3	4.3
49	PST-K13-139	7.2	8.0	6.7	6.0	6.7	7.0	7.7
50	AKB3179	6.6	7.3	7.0	5.0	5.3	6.0	5.3

(Continued)

Table 3. Kentucky bluegrass turf trial without traffic, 2017 (NTEP) (continued).

	Kentucky Bluegrass Entry	Turfgrass Quality (2018)[1] 2018 Avg.	May	June	July	Aug.	Sept.	Oct.
51	PPG-KB 1304	6.9	6.3	6.0	6.0	6.7	7.3	6.0
52	A16-1	6.1	6.0	6.7	4.3	5.0	6.0	5.3
53	A16-7	4.7	3.3	4.3	4.0	4.0	4.0	4.3
54	BAR PP 7236V	7.1	7.7	6.3	7.0	5.7	6.7	6.7
55	AKB3128	6.9	6.7	7.0	6.7	6.3	5.7	6.7
56	Skye	7.1	6.7	7.0	6.7	6.3	7.3	5.7
57	PST-K13-141	4.9	5.7	5.3	3.3	3.3	3.3	4.7
58	DLFPS-340/3446	5.4	5.3	6.0	3.3	4.7	4.3	4.0
59	PST-K11-118	7.5	7.0	7.7	7.3	7.0	7.0	7.3
60	Orion (PST-K13-143)	7.6	7.0	7.3	7.0	7.7	7.7	7.0
61	A13-1	5.7	5.3	4.7	4.3	5.3	5.7	5.7
62	DLFPS-340/3444	6.1	6.3	5.7	5.3	5.3	6.0	5.0
63	GO-2628	8.3	7.3	8.0	8.7	8.0	8.7	8.0
64	MVS-130	4.8	4.3	7.0	2.3	3.0	3.7	3.0
65	DLFPS-340/3551	6.1	5.0	6.7	4.7	5.7	6.0	6.0
66	J-1319	7.0	4.7	8.0	6.7	7.3	7.0	6.3
67	Unknown	5.4	3.3	3.7	5.7	5.3	5.7	6.0
68	A10-280	4.9	4.7	4.0	3.7	3.7	5.0	4.0
69	AKB3241	6.1	5.7	6.3	5.3	5.3	5.0	5.7
70	A99-2897	5.9	6.3	5.7	5.7	5.0	4.7	4.7
71	A06-8	5.7	4.0	6.0	5.0	5.3	5.0	5.7
72	DLFPS-340/3438	5.7	5.3	5.7	5.0	4.0	5.3	4.3
73	A11-40	6.6	7.0	6.0	5.7	5.7	6.3	6.3
74	NAI-14-128	5.1	5.7	7.7	2.7	2.7	3.0	3.7
75	NK-1	4.1	5.0	3.3	3.0	2.7	2.3	3.7

(Continued)

Table 3. Kentucky bluegrass turf trial without traffic, 2017 (NTEP) (continued).

	Kentucky Bluegrass Entry	Turfgrass Quality (2018)[1] 2018 Avg.	May	June	July	Aug.	Sept.	Oct.
76	PPG-KB 1320	6.4	7.0	8.0	3.7	5.3	6.0	5.7
77	Pivot	6.4	7.3	6.3	5.0	5.7	5.7	4.7
78	A12-34	5.2	3.3	5.3	4.7	5.3	4.7	4.3
79	Kenblue	4.0	2.3	3.0	3.0	3.7	3.3	5.3
80	RAD-1776	5.6	3.7	5.7	5.0	5.7	4.7	5.3
81	PST-K15-157	4.7	6.3	4.3	3.7	2.7	3.0	3.7
82	NAI-15-84	4.7	4.7	5.0	3.0	4.3	3.3	4.0
83	DLFPS-340/3364	3.1	1.7	2.7	2.3	2.7	2.3	2.3
84	NAI-14-176	4.6	3.3	7.0	3.0	3.3	3.0	4.0
85	DLFPS-340/3553	6.8	5.3	5.7	6.3	7.7	7.3	6.7
86	NAI-14-133	4.1	4.3	7.3	1.7	1.7	2.3	3.0
87	NAI-14-122	4.6	4.3	7.7	2.3	2.3	2.3	3.3
88	NAI-14-187	4.6	4.0	6.3	3.0	3.0	3.0	3.7
89	NAI-14-132	4.6	3.7	6.7	2.7	2.7	2.7	4.0
90	NAI-15-80	3.1	4.3	3.3	1.3	1.3	1.3	1.7
	LSD at 5% =	0.9	1.7	1.4	1.6	1.5	1.6	1.6

[1] 9 = best turf quality

Table 4. Performance of Kentucky bluegrass entries without traffic in a turf trial seeded in September 2017 at North Brunswick, NJ. (Includes all entries of the 2017 National Turfgrass Evaluation Program (NTEP) Kentucky Bluegrass Test.)

	Kentucky Bluegrass Entry	Spring Green-up[1] 6 April 2018	Seedheads[2] 18 May 2018	Leaf Spot[3] 18 May 2018	Color[4] 27 June 2018
1	Barvette HGT	4.3	9.0	6.3	2.7
2	Prosperity	5.3	8.3	9.0	8.7
3	PST-K15-172	1.7	5.3	8.7	3.7
4	J-1138	3.3	9.0	9.0	8.0
5	BAR PP 7K426	3.7	5.3	8.7	3.0
6	NAI-A16-3	4.3	5.3	9.0	3.7
7	BAR PP 71213	2.0	5.7	8.7	1.3
8	NAI-14-178	5.3	8.0	9.0	4.0
9	A-16-17	2.7	8.7	9.0	1.7
10	PST-K15-167	1.7	4.0	9.0	7.0
11	A11-38	2.7	7.3	8.3	3.3
12	After Midnight	2.3	8.7	9.0	9.0
13	DLFPS-340/3549	1.7	7.7	8.7	2.0
14	DLFPS-340/3552	4.3	3.3	9.0	6.0
15	DLFPS-340/3494	4.0	1.3	9.0	5.7
16	PPG-KB 1131	3.0	8.7	9.0	8.0
17	A11-26	1.3	8.7	8.7	6.7
18	DLFPS-340/3500	2.7	7.3	9.0	6.0
19	RAD 553	2.7	8.3	8.3	2.7
20	PST-11-7	2.7	5.3	9.0	5.0
21	DLFPS-340/3455	7.0	9.0	8.3	3.7
22	Midnight	3.7	9.0	8.7	8.3
23	BAR PP 7309V	5.0	4.7	8.3	2.7
24	NAI-13-14	3.0	9.0	9.0	8.0
25	BAR PP 79494	1.7	8.7	9.0	8.3
26	Blue Devil	3.3	7.3	9.0	6.7
27	DLFPS-340/3556	3.7	8.7	9.0	7.0
28	DLFPS-340/3548	3.0	7.7	8.0	5.3
29	KH3492	6.0	5.3	8.7	4.7
30	DLFPS-340/3550	4.3	9.0	9.0	7.7
31	GO-22B23	5.7	6.7	9.0	6.3
32	Yellowstone (A12-7)	5.0	3.7	9.0	4.0
33	NAI-13-9	3.7	9.0	8.7	7.7
34	BAP PP 79366	1.7	8.0	9.0	6.3
35	J-2726	2.0	8.7	9.0	7.0

(Continued)

Table 4. Kentucky bluegrass turf trial without traffic, 2017 (NTEP) (continued).

	Kentucky Bluegrass Entry	Spring Green-up[1] 6 April 2018	Seedheads[2] 18 May 2018	Leaf Spot[3] 18 May 2018	Color[4] 27 June 2018
36	LTP-11-41	4.0	9.0	8.7	5.0
37	A-15-6	4.3	4.3	9.0	4.7
38	PST-K15-177	3.3	2.3	9.0	7.7
39	Selway	3.0	8.7	7.0	4.0
40	PST-T14-39	4.7	7.3	8.7	6.7
41	J-3510	2.0	8.7	9.0	8.0
42	GO-2425	5.7	6.7	9.0	6.7
43	Babe	5.0	5.7	8.7	3.3
44	A-16-2	5.0	4.7	8.7	4.0
45	Shamrock	5.7	6.3	8.7	4.3
46	NAI-13-132	3.0	8.7	8.7	8.7
47	Barserati (BAR PP 110358)	4.3	5.7	8.7	3.0
48	Blue Knight	1.0	7.7	8.7	8.0
49	PST-K13-139	2.7	7.3	8.7	3.7
50	AKB3179	2.0	5.7	8.3	2.7
51	PPG-KB 1304	4.0	7.7	9.0	6.7
52	A16-1	5.7	5.3	9.0	4.0
53	A16-7	3.0	5.3	9.0	7.0
54	BAR PP 7236V	4.0	9.0	8.0	2.3
55	AKB3128	2.7	3.7	9.0	6.7
56	Skye	5.7	5.7	8.7	6.3
57	PST-K13-141	5.3	7.3	8.3	5.0
58	DLFPS-340/3446	5.3	4.3	9.0	5.0
59	PST-K11-118	4.7	6.0	8.7	3.0
60	Orion (PST-K13-143)	5.0	7.3	7.0	5.7
61	A13-1	2.3	7.7	9.0	6.0
62	DLFPS-340/3444	6.0	5.0	8.7	4.7
63	GO-2628	5.3	6.3	8.7	6.7
64	MVS-130	2.7	4.0	9.0	8.0
65	DLFPS-340/3551	3.7	2.7	8.7	6.3
66	J-1319	3.3	8.0	9.0	9.0
67	Unknown	7.0	9.0	4.3	4.0
68	A10-280	5.0	6.3	9.0	5.0
69	AKB3241	4.7	2.0	9.0	7.3
70	A99-2897	6.0	5.0	9.0	7.3

(Continued)

Table 4. Kentucky bluegrass turf trial without traffic, 2017 (NTEP) (continued).

	Kentucky Bluegrass Entry	Spring Green-up[1] 6 April 2018	Seedheads[2] 18 May 2018	Leaf Spot[3] 18 May 2018	Color[4] 27 June 2018
71	A06-8	3.3	3.0	9.0	6.7
72	DLFPS-340/3438	5.7	6.0	9.0	5.7
73	A11-40	5.7	7.3	9.0	3.0
74	NAI-14-128	3.0	6.3	9.0	8.0
75	NK-1	3.7	3.0	8.3	3.3
76	PPG-KB 1320	1.0	9.0	9.0	7.0
77	Pivot	4.3	8.3	9.0	6.3
78	A12-34	3.0	3.3	9.0	7.3
79	Kenblue	8.0	8.3	4.0	2.3
80	RAD-1776	4.3	7.7	4.7	5.7
81	PST-K15-157	5.3	6.7	8.7	8.3
82	NAI-15-84	3.0	5.0	9.0	5.7
83	DLFPS-340/3364	2.3	6.3	9.0	7.3
84	NAI-14-176	2.3	4.3	9.0	8.0
85	DLFPS-340/3553	4.7	8.7	9.0	6.0
86	NAI-14-133	3.0	4.3	9.0	7.3
87	NAI-14-122	2.3	5.7	9.0	7.7
88	NAI-14-187	2.7	3.0	9.0	8.0
89	NAI-14-132	2.0	6.0	9.0	8.7
90	NAI-15-80	3.0	3.7	9.0	3.0
	LSD at 5% =	1.4	1.3	0.8	1.1

[1]9 = earliest spring green-up
[2]9 = least seedheads
[3]9 = least disease
[4]9 = darkest green color