

Winter Overseeding Trials on Athletic Field - Fairway Height Bermudagrass – 2012/2013

Department of Crop Science, North Carolina State University
Raleigh, NC 27695-7620

Grady Miller and
Scott Brinton

North Carolina
State University

Best for Dark Color:

Natural Knit
ASP0112
ASP6003
ASP1001GL
Home Run
SRX MX 12

Best Quality:

Natural Knit
SRX MX 12
ASP6003
Flash II

Highest Shear Value:

Flash II

Best Transition:

Blend of →
Panterra +
Panterra V +
Peak +
Premier II

Highest (4) Growth Rate:

Gulf
SPR
Natural Knit
ASP6001

Abstract:

In Raleigh, NC twenty-four cool-season grasses were overseeded on a 'Patriot' bermudagrass athletic field/fairway at 14 pounds 1000 ft⁻². In this test, grasses with the best overall rated color scores included Natural Knit, ASP0112, ASSP6003, ASP1001GL, Home Run, and SRX MX 12 (entries: 1, 10, 14, 11, 4 and 21). Using Digital color evaluations, the top group was Natural Knit, ASP0112, ASP1001 GL, ASP6004, Home Run, ASP6003, and Prosaline Mix (entries: 1, 10, 11, 15, 4, 14, and 9). The RGB color table illustrates the differences in genetic color among the grasses. The grass with the best overall quality was Natural Knit (entry 1). The next highest was a group that included SRX MX12 (entry 21), ASP6003 (entry 14), and Flash II (entry 5). Gulf annual ryegrass (entry 25) was included as a check and had the lowest quality value. Regrowth of bermudagrass (related to transition quality) varied among cultivar treatments, but Gulf and the blend of Panterra:Panterra V:Peak:Premier II performed best for transition. These entries along with some of the other annual ryegrasses generally transitioned better than the perennial ryegrasses. Breakout was the best transitioning perennial ryegrass. No annual ryegrass made it within the top performing group (of 13 entries) for texture. Disease incidence was not as prevalent as it has been in other years. Bar LM 10723:Bar LM 10725 and BAR LM 10723:BAR LM 10725:Premier II did experience some snow mold. Shear data on the athletic field height study indicated Flash II was the most difficult to shear/divot. Any overseed significantly increased shear/divot strength (by 52 to 79%), illustrating a significant positive attribute of overseeding.

Introduction:

Throughout the southern United States turf managers at golf courses, sports turfs, and some home lawns overseed warm-season grasses with cool-season turfgrasses during winter months. This practice results in green, turf surfaces and improves playing areas when bermudagrass or other warm-season turfgrasses are dormant. Turfgrass breeders and seed producers continue to develop new grasses resulting in numerous cool-season grasses for overseeding. In addition to new cultivars, seed producers also formulate new grass mixtures and blends. Timely trials are needed to evaluate performance and to provide information to potential users of these grasses. The objective of this study was to evaluate suitability of selected cool-season turfgrasses for winter overseeding of a bermudagrass fairway/athletic field in the transition zone.

The seeds tested and seed source can be found in Table 1. The authors acknowledge the seed suppliers for their contributions to these studies.

Materials and Methods:

This study was conducted during the 2012-2013 growing season for cool-season grasses in the transition zone under fairway conditions. Twenty-four entries of cool-season grasses (ryegrasses) listed in Table 1 were overseeded on a 'Patriot' bermudagrass (*Cynodon dactylon* x *C. transvaalensis*) grown on Cecil sandy loam (fine kaolinitic, thermic, Typic Kanhapludults) on 23 October 2012. Bermudagrass check plots, which were not overseeded, were included in the study for comparison. The field study was conducted at the North Carolina State University's Lake Wheeler Turfgrass Field Lab.

The overseeding study was conducted on Patriot bermudagrass that was scalped to 0.5 inch with a reel mower before overseeding. A shaker bottle was used to hand seed all plots accurately and uniformly. Ryegrass (*Lolium* spp.) entries were seeded at a rate of 14 pounds per 1000 ft². Light irrigation was applied twice daily for three weeks following seeding. This was then reduced to a maximum of once per day to replace water loss from evapotranspiration.

The study was mown with a reel mower for the first time fourteen days after seeding at a 1.2 inch bench height and was mown at this height every other day until day 21. The mowing height was reduced to 1.0 inch on day 22 and this height was continued until day 28. From day 29 until day 35 the plots were mown at 0.90 before being lowered to 0.75. From day 35 until the conclusion of the study, the area was mown at 0.75 inches. The study area was generally mown three times a week.

An application of 0.5 pounds N per 1000 ft² was applied using ammonium sulfate on 6 and 20 November 2012. Urea was used for fertilizations of 0.2 pounds N per 1000 ft² on 4 December 2012. On 14 January, 12 February, 12 March, and 9 April [year=2013], 0.5# N per 1000 ft² was applied using ammonium sulfate.

No herbicide or insecticides were applied to the area during the study. A small amount of pink snow mold was observed so it was rated. Iprodione (26GT) was applied at label rate (4 oz/M) on 28 January for snow mold. At no time during the growing months were the turfgrass stands significantly reduced due to disease incidence.

Ratings included visual estimates of percent cover (0-100%), color (1=brown; 2=brownish-yellow; 3=yellow; 4=yellow-green; 5=greenish-yellow; 6=green; 7=bluish-green; 8=dark green; and 9=deep dark green), and quality (overall appearance and stand uniformity value) with 1.0 = dead grass, 5.0 considered minimally acceptable, and 9 = highest quality. Digital color photo analysis was conducted from on days 56, 91, 119, 147, 175, and 203 (December 2012 through May 2013). Photographs were taken using a Nikon D80 SLR camera and analyzed with ImageJ software to determine hue (H) saturation (S) and brightness (B) values. Digital green color index (DGCI) values were calculated (DGCI value = [(H - 60)/60 + (1 - S) + (1 - B)]/3). A Pantone color chart was used to determine ryegrass genetic color. A visual 1 - 9 texture estimate was taken in March (147 DAP) with 1 = very coarse and 9 = fine. Two disease evaluations were taken during the study, pink snow mold ratings were taken in January (91 DAP) and in February (105 DAP). In addition to that data, in March (147 DAP) root shear ratings (N m force) were measured using a Clegg Shear tester.

M & M (continued):

The study was planted in a randomized complete block design with four replications. All data were subjected to analysis of variance. Means were separated using a Fisher's protected LSD test at 5% level of probability. Data were summarized as growth rate and color across date intervals and presented as gross means in Tables 3 and 7. Data collected from individual dates were summarized in tables and presented with LSD values and variation as CV%. Weather data was summarized from a nearby weather station as daily high and low temperatures and presented in two figures (page 3 and 8).

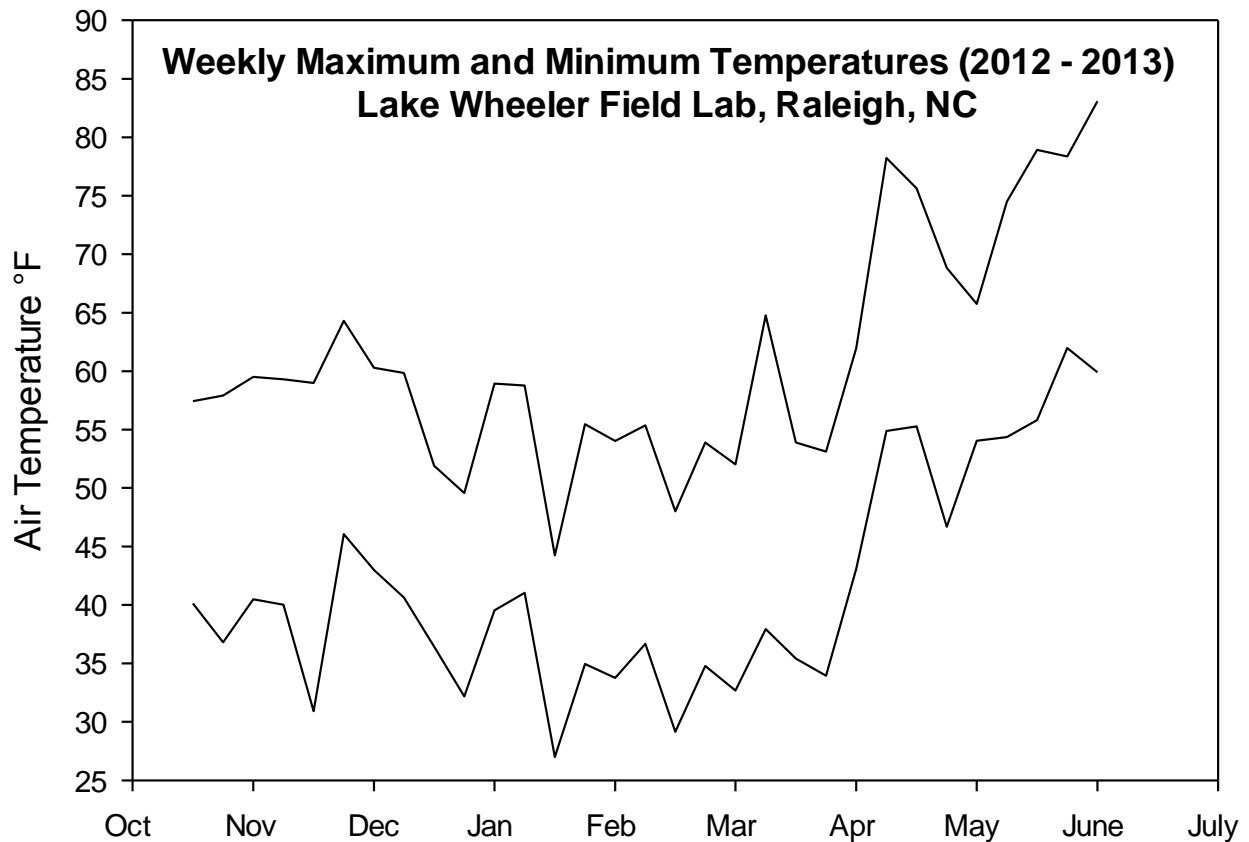


Table 1. Composition and seed source of cool-season turfgrasses evaluated in overseeding trials at Raleigh, NC during the 2011–2012 winter season and transition period.

Entry Number	Entry Name	Seed Type	Sponsoring Company
1	Natural Knit	Spreading perennial	Ledeboer Seed LLC
2	SPR	Spreading perennial	Ledeboer Seed LLC
3	PPG-PR 168	Perennial	Mountain View Seeds
4	Home Run	Perennial	Mountain View Seeds
5	Flash II	Perennial	Mountain View Seeds
6	Breakout	Annual	Mountain View Seeds
7	Solstice II	Intermediate	Mountain View Seeds
8	PPG Trans Rye 107:PPG-12-RS-1	Annual	Turf Merchants, Inc.
9	Prosaline Mix	Saltinas Perennial and Oceania Maritima mix	Turf Merchants, Inc.
10	ASP0112	Perennial	Allied Seed, L.L.C.
11	ASP1001GL	Perennial	Allied Seed, L.L.C.
12	ASP6001	Perennial	Allied Seed, L.L.C.
13	ASP6002	Perennial	Allied Seed, L.L.C.
14	ASP6003	Perennial	Allied Seed, L.L.C.
15	ASP6004	Perennial	Allied Seed, L.L.C.
16	Panterra:Panterra V	Annual	Barenbrug
17	BAR LM 10723: BAR LM 10725	Annual	Barenbrug
18	Panterra: Panterra V: Peak: Premier II	Annual/Perennial	Barenbrug
19	BAR LM 10723:BAR LM 10725:Premier II	Annual/Perennial	Barenbrug
20	46-09-IR-SAS	Intermediate	Pickseed
21	SRX MX 12	Perennial/Intermediate	Pickseed
22	PSAR 09-2	Annual	Pickseed
23	TXR	Annual	Pickseed
24	Gulf	Annual	NCSU
25	Control	NA	NA

Table 2. To determine month that data was taken, refer to key at bottom of table.

First Day of Each Month→	November	December	January	February	March	April	May	June
Days After Overseeding→	9	39	70	101	129	160	190	221

Table 3. Overseed cover rate (%) estimates and (normalized) average daily coverage rate (%) for first 28 days after overseeding Patriot bermudagrass on 23 October 2012 in Raleigh, NC.

Turfgrass	Cover Rate	Average daily coverage rate for first month
1	2.14	2.23
2	2.14	2.32
3	1.69	1.83
4	1.80	1.92
5	1.98	2.06
6	1.88	1.92
7	1.75	1.79
8	1.65	1.79
9	1.62	1.79
10	1.65	1.83
11	1.56	1.79
12	2.09	2.10
13	1.48	1.79
14	1.79	2.01
15	1.72	1.97
16	1.49	1.57
17	1.97	1.92
18	1.69	1.79
19	1.73	1.79
20	1.68	1.74
21	1.96	2.05
22	1.88	1.79
23	1.79	1.83
24	2.19	2.05
25	0.00	0.00
LSD (P=0.05)	0.352	0.282
CV%	14	10

Table 4. Cover rate estimates after overseeding Patriot bermudagrass on 23 October 2012 in Raleigh, NC.

Turfgrass	Turfgrass Cover Estimates at Day							
	8	14	21	28	42	56	77	91
1	8.7	30.0	48.7	62.5	72.5	92.5	97.0	99.50
2	7.5	27.5	50.0	65.0	71.2	87.5	92.0	97.00
3	4.2	23.7	38.7	51.2	56.2	83.7	92.5	97.00
4	7.5	26.2	38.7	53.7	58.7	83.7	91.2	96.50
5	8.5	30.0	42.5	57.5	62.5	88.7	96.5	100.00
6	9.2	28.7	40.0	53.7	63.7	92.5	95.0	96.00
7	8.7	26.2	37.5	50.0	58.7	94.5	98.7	99.50
8	4.2	23.7	37.5	50.0	60.0	87.5	92.5	97.75
9	4.7	17.5	41.2	50.0	53.7	86.2	92.5	99.00
10	4.2	21.2	38.7	51.2	56.2	83.7	92.5	95.75
11	5.5	16.2	37.5	50.0	55.0	80.0	88.7	95.75
12	11.2	32.5	43.7	58.7	65.0	85.0	93.7	97.00
13	2.7	13.7	37.5	50.0	55.0	78.7	88.7	94.50
14	6.2	20.0	42.5	56.2	58.7	82.5	92.5	97.00
15	4.2	20.0	41.2	55.0	58.7	82.5	91.2	96.50
16	6.7	21.2	32.5	43.7	51.2	87.5	91.2	99.00
17	12.5	31.2	40.0	53.7	62.5	93.2	97.7	87.50
18	6.7	23.7	37.5	50.0	57.5	86.2	93.2	97.75
19	8.7	26.2	36.2	50.0	58.7	86.2	91.2	86.25
20	6.2	25.0	37.5	48.7	55.0	85.0	92.5	97.00
21	7.5	28.7	43.7	57.5	68.7	90.7	97.0	99.50
22	11.2	30.0	40.0	50.0	60.0	92.5	94.5	97.75
23	10.0	25.0	38.7	51.2	58.7	89.5	93.7	97.50
24	18.7	33.7	43.7	57.5	62.5	87.5	87.5	93.75
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
LSD (P=0.05)	4.0	8.2	7.9	7.8	7.9	7.4	6.0	4.2
CV%	38	24	14	10	9	6	4	3

Table 5. Cover rate estimates after overseeding Patriot bermudagrass on 23 October 2012 in Raleigh, NC.

Turfgrass	Turfgrass Cover Estimates at Day								
	105	119	133	147	161	175	189	203	217
1	99.5	99.5	98.7	98.7	99.5	99.5	100.0	100.0	87.5
2	97.7	97.7	96.5	96.5	98.2	98.7	98.7	98.7	82.5
3	97.0	97.7	97.0	97.0	97.0	98.7	98.7	98.7	77.5
4	96.5	97.2	97.7	99.0	100.0	100.0	100.0	100.0	80.0
5	100.0	100.0	99.5	99.5	99.0	99.0	99.5	99.5	66.2
6	97.2	98.5	97.7	98.5	99.0	99.5	91.2	61.2	22.5
7	99.0	99.5	100.0	100.0	100.0	100.0	92.5	81.2	26.2
8	98.2	98.7	98.7	98.7	98.7	98.7	96.2	83.7	25.0
9	98.5	98.5	97.7	98.5	99.0	99.0	99.5	99.5	71.2
10	97.0	98.2	95.7	95.7	97.5	97.5	98.2	98.2	75.0
11	96.5	97.2	96.5	97.2	97.7	97.7	98.2	98.2	80.0
12	97.0	97.0	97.0	97.0	98.5	99.5	99.5	99.5	81.2
13	95.7	97.0	93.7	95.7	96.5	96.5	97.0	97.0	80.0
14	98.2	99.0	98.2	98.2	98.2	98.2	98.2	98.2	82.5
15	97.0	97.0	97.0	97.0	97.5	98.7	99.5	99.5	82.5
16	100.0	100.0	98.5	100.0	100.0	100.0	90.0	66.2	27.5
17	86.2	91.2	93.7	97.2	99.0	99.5	90.0	73.7	15.0
18	98.5	99.0	99.0	99.0	99.5	97.5	77.5	65.0	15.0
19	87.5	91.2	94.5	98.5	99.5	100.0	88.7	75.0	15.0
20	98.2	99.5	97.7	97.7	100.0	100.0	95.7	83.7	18.7
21	100.0	100.0	99.5	99.5	98.7	98.7	97.5	97.5	73.7
22	99.5	99.5	100.0	100.0	100.0	100.0	88.7	60.0	21.2
23	98.2	99.0	99.5	99.0	100.0	100.0	91.2	65.0	20.0
24	93.7	95.2	97.7	97.7	100.0	97.5	82.5	57.5	16.2
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LSD (P=0.05)	4.0	2.6	3.3	3.0	2.7	3.1	4.6	5.4	9.7
CV%	3	2	2	2	2	2	3	4	13

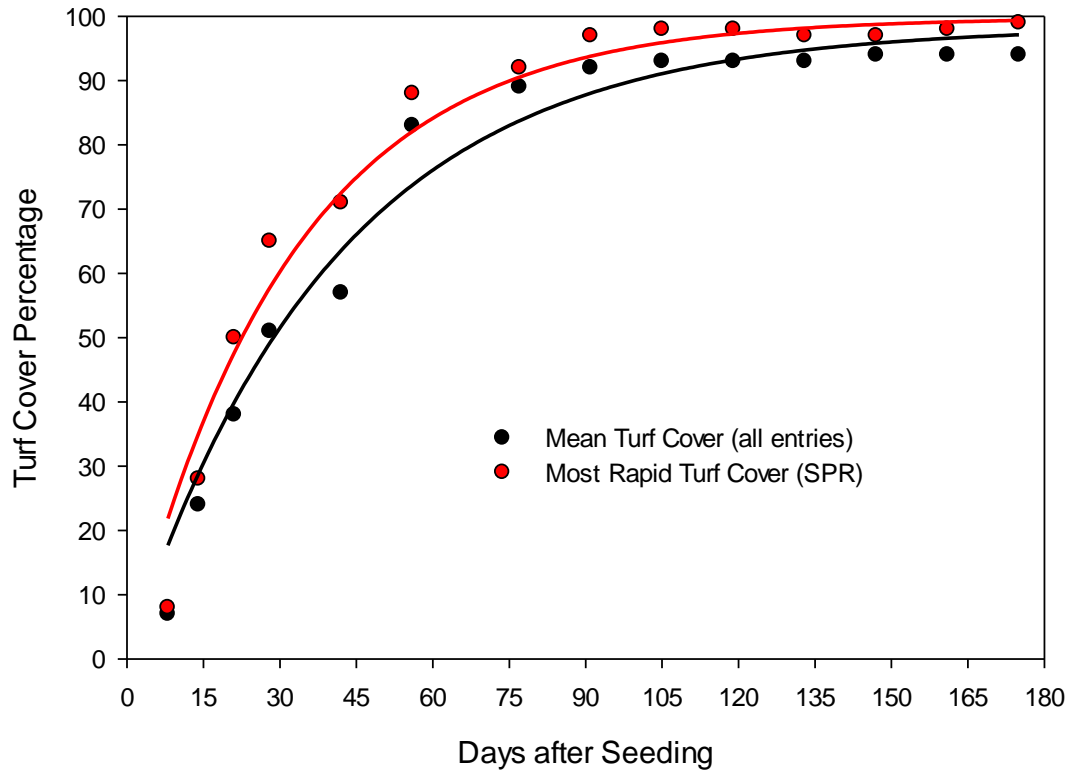


Fig. 1. Turf coverage comparison graph showing mean turf cover of all entries compared to most rapid turf cover entry (SPR).

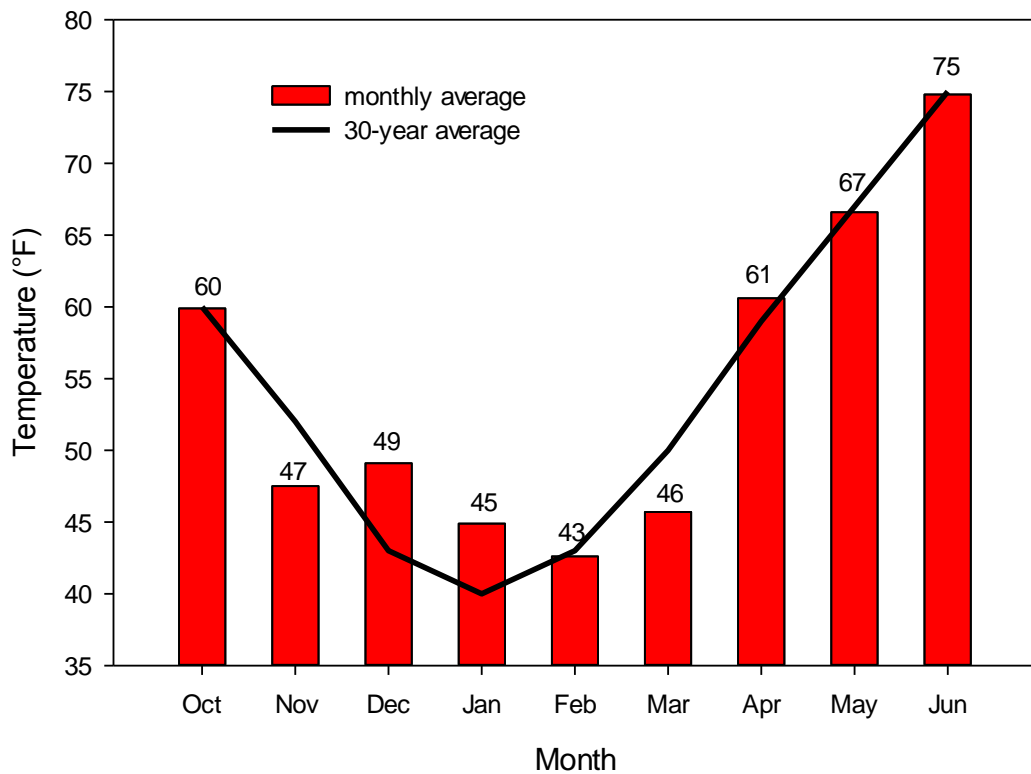


Table 6. Color estimates after overseeding Patriot bermudagrass on 23 October 2012 in Raleigh, NC. Turf color based on a 1-9 scale, where 1=dead grass, 2=dull yellow-green, 3=pale yellow green, 4=yellow green, 5=pale green, 6=green, 7=dark green, 8=deep dark green, and 9=black green.

Turfgrass	Turfgrass Color Estimates at Day								
	28	42	56	77	91	105	119	133	147
1	5.7	5.5	7.2	8.0	8.0	8.0	7.5	7.5	7.7
2	5.2	5.2	6.5	7.2	7.2	7.2	7.2	7.2	7.2
3	5.0	4.7	6.2	7.2	7.2	7.2	7.0	7.0	7.2
4	5.0	5.0	6.0	7.2	7.2	7.2	7.2	7.2	7.7
5	5.5	5.5	6.7	7.2	7.5	7.0	7.0	6.7	7.0
6	5.0	5.0	5.7	5.7	6.0	6.0	5.5	5.7	5.5
7	4.7	5.2	5.7	5.7	5.7	5.7	5.7	5.7	5.7
8	4.2	4.5	5.5	5.5	6.0	5.2	5.5	5.5	5.5
9	5.2	4.7	6.7	7.2	7.2	7.2	7.5	7.5	7.5
10	5.2	5.0	6.7	7.5	7.7	7.7	7.7	7.5	7.5
11	5.0	4.2	6.0	7.0	8.0	7.7	7.7	7.7	7.7
12	4.5	4.7	5.5	6.0	6.2	6.5	6.5	6.7	6.7
13	4.5	4.5	5.7	6.7	7.2	7.2	7.0	7.2	7.2
14	5.0	5.0	6.2	7.2	7.7	7.5	7.7	7.5	7.5
15	5.0	5.0	6.2	7.0	7.2	7.2	7.2	7.0	7.0
16	4.0	4.0	4.7	5.0	5.0	4.7	5.0	5.0	5.0
17	5.2	5.2	6.0	6.0	4.5	4.0	5.0	6.0	6.0
18	4.5	4.5	5.5	5.7	6.0	5.7	5.5	5.5	5.5
19	4.5	4.7	5.5	6.0	4.7	4.7	5.2	6.0	6.0
20	4.7	4.5	5.5	5.7	5.7	5.7	5.7	6.0	6.5
21	5.5	5.5	7.0	7.5	7.5	7.5	7.5	7.5	7.5
22	4.5	4.7	5.2	5.0	5.2	5.0	5.2	5.5	5.7
23	4.7	5.0	5.7	5.7	6.0	5.7	6.0	6.0	6.0
24	3.0	3.0	3.2	3.5	3.7	3.7	3.7	3.7	4.0
25	2.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LSD (P=0.05)	0.66	0.77	1.10	0.67	0.63	0.63	0.64	0.75	0.67
CV%	10	11	13	7	7	7	7	8	7

Table 7. Color estimates after overseeding Patriot bermudagrass on 23 October 2012 in Raleigh, NC. Turf color based on a 1-9 scale, where 1=dead grass, 2=dull yellow-green, 3=pale yellow green, 4=yellow green, 5=pale green, 6=green, 7=dark green, 8=deep dark green, and 9=black green. Note season mean estimate is influenced by early- and late-season bermudagrass color.

Turfgrass	Turfgrass Color Estimates at Day					Season Mean
	161	175	189	203	217	
1	7.7	8.0	8.0	8.0	7.2	7.4
2	7.2	7.5	7.5	7.7	7.5	7.0
3	7.0	7.5	7.5	8.0	7.7	6.9
4	7.7	7.7	8.0	7.7	7.5	7.0
5	7.0	7.0	7.2	7.5	7.0	6.8
6	5.5	5.7	5.2	4.0	4.2	5.3
7	5.7	6.0	5.5	5.0	4.0	5.4
8	5.7	5.7	6.0	5.7	4.7	5.3
9	7.5	7.2	7.2	7.2	6.7	6.9
10	8.0	8.0	8.5	9.0	8.0	7.4
11	7.5	7.5	7.7	8.2	8.0	7.1
12	6.7	7.2	7.2	7.0	6.2	6.2
13	7.5	7.5	8.0	8.2	8.0	6.9
14	7.5	7.5	8.0	8.2	8.0	7.1
15	7.0	7.7	7.7	8.2	7.5	6.9
16	5.0	5.0	4.0	3.7	3.5	4.5
17	5.7	5.7	5.5	5.0	5.0	5.3
18	5.5	5.0	5.0	4.7	5.0	5.2
19	6.0	6.0	5.7	5.5	5.5	5.4
20	6.5	6.5	6.0	6.0	4.7	5.7
21	7.7	7.5	6.7	7.0	6.5	7.0
22	5.5	5.5	4.5	4.2	3.7	4.9
23	6.0	6.0	5.0	4.2	4.0	5.4
24	4.0	4.0	3.0	3.0	3.7	3.5
25	1.0	3.7	5.5	6.7	7.2	2.4
LSD (P=0.05)	0.64	0.61	0.62	0.56	0.60	0.18
CV%	7	6	6	6	7	8

Table 8. Quality estimates after overseeding Patriot bermudagrass on 23 October 2012 in Raleigh, NC. Turf quality based on a 1-9 scale, where 1=dead grass, 5=minimally acceptable quality, and 9 = highest quality.

Turfgrass	Turfgrass Quality Estimates at Day							
	28	42	56	77	91	105	119	133
1	4.7	5.0	6.0	7.2	7.7	7.7	7.2	7.2
2	5.0	5.0	4.7	6.0	7.0	6.5	6.5	6.2
3	4.2	4.7	5.0	6.0	6.5	6.5	6.5	6.5
4	4.5	4.7	4.5	5.7	6.5	6.5	6.2	6.5
5	4.5	4.7	5.2	6.5	7.5	6.7	6.7	6.2
6	4.0	4.7	5.7	6.0	5.7	6.0	6.0	6.2
7	3.5	5.0	6.0	6.2	6.0	6.0	6.0	6.5
8	4.0	4.5	5.2	5.2	5.7	5.2	5.7	5.5
9	4.0	4.2	5.0	6.0	7.0	7.2	7.2	7.0
10	4.5	4.5	5.2	6.2	6.7	6.7	7.0	6.5
11	4.0	4.0	4.2	5.2	6.5	6.5	6.5	6.7
12	4.2	4.7	5.0	5.5	6.2	5.5	5.5	5.5
13	3.7	4.2	4.7	6.0	6.7	6.0	6.0	6.0
14	4.7	4.7	5.2	6.2	6.7	6.7	6.7	6.7
15	4.0	4.5	5.0	6.5	6.7	6.5	6.5	6.2
16	3.5	4.2	5.0	5.0	5.2	5.2	5.2	5.0
17	4.0	4.7	6.0	6.0	4.0	3.7	4.0	5.0
18	4.0	4.5	5.2	5.7	5.7	5.5	5.7	5.5
19	4.5	4.5	5.2	5.7	4.5	4.0	4.5	5.5
20	4.0	4.2	5.0	5.5	6.5	6.5	6.2	6.0
21	4.5	5.0	6.2	7.2	7.5	7.7	7.5	7.2
22	3.5	4.5	5.0	5.2	5.7	5.7	5.7	5.7
23	4.0	4.7	5.7	5.7	5.5	5.7	5.5	6.0
24	3.0	3.0	3.5	4.0	4.2	4.0	4.0	4.0
25	2.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LSD (P=0.05)	0.55	0.74	1.00	0.96	0.96	0.95	0.91	0.77
CV%	9	12	14	12	11	11	11	9

Table 9. Quality estimates after overseeding Patriot bermudagrass on 18 October 2011 in Raleigh, NC. Turf quality based on a 1-9 scale, where 1=dead grass, 6=minimally acceptable quality, and 9 = highest quality.

Turfgrass	Turfgrass Quality Estimates at Day						Season Mean
	147	161	175	189	203	217	
1	7.7	7.7	8.0	8.0	8.0	7.0	7.1
2	6.5	6.7	7.2	7.5	7.7	7.0	6.4
3	6.2	6.7	7.5	7.5	8.0	7.0	6.3
4	6.7	7.5	7.7	7.7	8.0	6.7	6.4
5	6.7	7.0	7.2	7.5	7.5	6.7	6.5
6	6.2	5.7	6.2	5.5	3.7	3.5	5.3
7	6.7	6.7	7.0	6.0	5.2	4.0	5.7
8	5.5	5.7	6.2	6.0	5.2	4.0	5.2
9	7.2	7.2	7.0	7.5	7.7	6.2	6.4
10	6.2	7.0	7.5	7.5	8.0	6.5	6.4
11	6.5	7.2	7.5	7.5	7.7	7.0	6.2
12	5.7	6.5	7.0	7.2	7.2	6.5	5.8
13	6.0	6.7	7.0	7.2	7.7	7.0	6.0
14	6.5	7.2	7.2	7.2	7.7	7.0	6.5
15	6.2	6.7	7.2	7.7	7.7	7.0	6.3
16	5.0	5.0	5.2	4.5	3.7	3.2	4.6
17	5.7	5.5	6.0	5.2	4.5	4.0	4.8
18	5.2	5.5	5.0	4.5	4.5	4.0	5.0
19	5.5	5.7	6.0	5.5	4.7	4.2	5.0
20	6.0	6.2	6.7	6.7	6.0	4.0	5.6
21	7.2	7.2	7.0	6.7	7.0	5.7	6.7
22	6.0	5.7	6.0	5.5	4.5	3.2	5.1
23	6.0	6.2	6.5	5.5	4.0	3.2	5.3
24	4.0	4.0	4.0	3.5	3.0	3.2	3.6
25	1.0	1.0	3.2	5.0	5.7	6.0	2.2
LSD (P=0.05)	0.94	0.85	0.91	0.79	0.64	0.56	0.22
CV%	11	9	9	8	7	7	10

Table 10. Bermudagrass coverage estimates after overseeding Patriot bermudagrass on 23 October 2012 in Raleigh, NC.

Turfgrass	Bermudagrass Coverage at Day			
	175	189	203	217
1	0.0	0.0	0.0	12.5
2	0.0	1.2	1.2	17.5
3	1.2	1.2	1.2	22.5
4	0.0	0.0	0.0	20.0
5	0.0	0.5	0.5	33.7
6	0.0	8.7	38.7	77.5
7	0.0	7.5	18.7	71.2
8	1.2	3.7	16.2	75.0
9	0.5	0.5	0.5	28.7
10	1.2	1.7	1.7	25.0
11	1.2	1.7	1.7	20.0
12	0.5	0.5	0.5	18.7
13	2.5	3.0	3.0	20.0
14	1.2	1.7	1.7	17.5
15	0.0	0.5	0.5	17.5
16	0.0	10.0	33.7	72.5
17	0.0	10.0	26.2	85.0
18	2.5	22.5	35.0	85.0
19	0.0	11.2	25.0	85.0
20	0.0	4.2	16.2	81.2
21	0.0	2.5	2.5	26.2
22	0.0	11.2	40.0	78.7
23	0.0	8.7	35.0	80.0
24	2.5	17.5	42.5	83.7
25	71.2	87.5	97.5	100.0
LSD (P=0.05)	3.68	4.68	5.49	9.73
CV%	76	38	22	13

Table 11. Texture (1 to 9 scale), shear strength (N m force), snow mold (rating 1 to 9 scale, 9=no incidence), and gray leaf spot (rating 1 to 9 scale, 9=no incidence) after overseeding Patriot bermudagrass on 23 October 2012 in Raleigh, NC.

Turfgrass	Texture	Shear Strength	Snow Mold	Snow Mold
	Day 147	Day 147	Day 91	Day 105
1	8.0	125.0	9.0	9.0
2	8.0	120.0	9.0	9.0
3	8.0	120.7	9.0	9.0
4	8.0	120.0	9.0	9.0
5	8.0	125.7	9.0	9.0
6	7.0	107.5	8.0	7.8
7	7.0	107.0	8.0	8.0
8	7.0	115.5	7.7	7.8
9	8.0	113.7	9.0	9.0
10	8.0	124.2	9.0	9.0
11	8.0	117.5	9.0	9.0
12	8.0	117.2	9.0	9.0
13	8.0	124.7	9.0	9.0
14	8.0	111.0	9.0	9.0
15	8.0	115.7	9.0	9.0
16	6.0	115.2	8.5	8.5
17	6.5	109.7	3.0	3.0
18	6.0	114.0	8.7	8.6
19	6.5	110.5	3.5	3.8
20	7.0	112.2	9.0	9.0
21	7.7	118.2	9.0	9.0
22	6.0	108.7	9.0	8.8
23	6.0	111.7	7.7	7.7
24	5.0	109.5	9.0	8.5
25	.	70.2	.	.
LSD (P=0.05)	0.28	11.8	0.63	0.69
CV%	2	7	5	6

Table 12. Average color ratings based on digital image analysis (DGC = Digital Green Color Index) estimates after overseeding Patriot bermudagrass on 23 October 2012 in Raleigh, NC.

Turfgrass	Digital Green Color Index Value at Day					
	56	91	119	147	175	203
1	0.51	0.50	0.48	0.50	0.56	0.56
2	0.48	0.46	0.47	0.47	0.57	0.55
3	0.48	0.45	0.45	0.45	0.54	0.55
4	0.48	0.46	0.48	0.49	0.58	0.54
5	0.50	0.46	0.44	0.46	0.55	0.53
6	0.46	0.42	0.42	0.42	0.51	0.37
7	0.48	0.41	0.43	0.44	0.52	0.40
8	0.45	0.40	0.40	0.41	0.52	0.45
9	0.50	0.48	0.47	0.47	0.55	0.54
10	0.50	0.48	0.47	0.47	0.58	0.58
11	0.49	0.47	0.47	0.48	0.56	0.58
12	0.49	0.44	0.45	0.47	0.56	0.52
13	0.47	0.45	0.44	0.45	0.56	0.57
14	0.50	0.48	0.47	0.46	0.55	0.57
15	0.49	0.47	0.46	0.48	0.56	0.57
16	0.46	0.41	0.41	0.41	0.49	0.39
17	0.47	0.34	0.43	0.42	0.49	0.42
18	0.45	0.41	0.41	0.41	0.48	0.45
19	0.45	0.36	0.42	0.42	0.51	0.45
20	0.47	0.43	0.43	0.45	0.53	0.44
21	0.50	0.46	0.46	0.47	0.54	0.50
22	0.45	0.42	0.42	0.41	0.48	0.39
23	0.46	0.42	0.43	0.43	0.51	0.39
24	0.44	0.38	0.40	0.40	0.43	0.40
25	0.20	0.19	0.21	0.20	0.45	0.50
LSD (P=0.05)	0.042	0.037	0.040	0.046	0.029	0.019
CV%	6	6	6	7	4	2

Table 13. Entry number, entry name, turf color and Red-Green-Blue (RGB) number. The turf color fill represents the RGB numbers from last column. The color may appear different on different computers/printers; whereas the RGB number is a standard color reference.

Entry name	RGB color (day 147)	RGB
Natural Knit		53-78-29
SPR		57-81-31
PPG-PR 168		62-87-33
Home Run		59-82-31
Flash II		59-84-31
Breakout		87-109-38
Solstice II		74-101-35
PPG Trans Rye 107:PPG-12-RS-1		89-102-37
Prosaline Mix		67-89-32
ASP0112		47-68-28
ASP1001GL		61-82-32
ASP6001		56-82-29
ASP6002		55-75-29
ASP6003		61-82-31
ASP6004		59-80-28
Panterra:Panterra V		91-112-40
BAR LM 10723: BAR LM 10725		85-108-40
Panterra: Panterra V: Peak: Premier II		82-105-37
BAR LM 10723:BAR LM 10725:Premier II		84-107-39
46-09-IR-SAS		69-94-32
SRX MX 12		53-81-30
PSAR 09-2		93-114-40
TXR		79-101-37
Gulf		96-117-40
Control		158-138-78

November 20, 2012 – Day 28



November 26, 2012 – Day 34



December 4, 2012 – Day 42



December 18, 2012 – Day 56



January 21, 2013 – Day 90



February 20, 2012 – Day 120



March 15, 2013 – Day 143



April 16, 2013 – Day 175



May 14, 2013 – Day 203



May 28, 2013 – Day 217



Results and Discussion:

Temperatures were generally close to normal during the growing season (figure, page 8). November was several degrees below normal but temperatures rebounded to be several degrees above normal in December and January. During April, May, and June temperatures were normal. Rainfall amounts were above normal through the spring months (data not shown) with Raleigh currently about 12 inches above normal for 2013. Raleigh experienced only one day in the 90's through July 4th and few days in the upper 80s. The result was healthy overseed turf that continued to compete with bermudagrass into summer. Most overseed entries still had some residual influence on bermudagrass density the first week of July.

Rate of establishment in the fairway/athletic field study varied between overseed grasses with the slowest average being Panterra:Panterra V compared to SPR with a 48% faster establishment rate over the study period. The others in the fast establishing group at the top included: Natural Knit, ASP6001, Flash II, ARX MX 12, and Gulf. The grow-in rate the first month had nine entries in the top performing group. The group contained all these mentioned above plus BAR LM 10723:BAR LM 10725, Breakout, and PSAR 09-2. In terms of a mean for the entire evaluation period for turf coverage, Natural Knit stood above the rest at 82%. The lowest for coverage was BAR LM 10723:BAR LM 10725:Premier II., which averaged a respectable 70%. During the first 28 days of evaluation, SPR covered on average 18% faster than the mean of all entries and 47% faster than the slowest entry. Over 42 days SPR covered an average 22% faster than the mean of the other entries. Maximum coverage percentages were achieved by 119 DAP with declining cover starting after 175 DAP.

In terms of average quality (density & color) for the duration of the test, Natural Knit came out on top. The next highest performing group contained SRX MX 12, ASP6003, and Flash II. In terms of just color, Natural Knit and APS0112 were on average the best grasses. The next highest performing group included ASP6003, ASP1001GL, Home Run, and SRX MX 12. In terms of digital evaluation of dark green color, the highest rating entries were also Natural Knit and ASP0112. Also evaluated among the darkest include ASP1001 GL, ASP6004, Home Run, ASP6003, and Prosaline Mix. The entry with the lowest digital color and color rating was Gulf.

Fine leaf texture is important to some for blending in with other grasses. Five grasses, Gulf, TXR, PSAR 09-2, Pantera:Panterra V blend, and Panterra:Pantera V:Peak:Premier II blend all rated as having coarser textures than the other grasses.

Disease ratings were taken only when there seemed to be a significant incidence consistently on an entry. The two bends with BAR LM 10723 and BAR LM 10725 were the only entries that had significant snow mold.

In situ shear strength data put Flash II at the top (126 N m) and Solstice II at the bottom (107 N m). This 15% drop is significant in terms of holding up under heavy cleat traffic or club divoting. It should be noted that adding an overseed increased shear strength by at least 52% and using Pangea GLR as the overseed increases shear strength 79% over non-overseeded.

Some of the data was variable by entry over time. For specifics on an entry, consult the preceding tables with monthly data for specifics.

NC State University

Grady Miller
Professor and Extension
Specialist
Crop Science Department
Campus Box 7620
Raleigh, NC 27695

grady_miller@ncsu.edu

voice: 919 515-5656

Scott Brinton
Research Specialist
Crop Science Department

scott_brinton@ncsu.edu

voice: 919 515-2661