

2014-02-491

Project Title: The evaluation of novel hybrid bluegrass in northwest Oklahoma as low-input turf

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Objectives:

1. Further evaluate hybrid selections in greenhouse and field trials
2. Establish larger seed production plots for the best performing hybrids

Selecting turfgrass that requires less water and remains green longer under hot dry conditions is a high priority in many breeding programs as water used for irrigation becomes more costly or restricted. The objectives were to combine the heat and drought tolerant traits from Texas bluegrass (*Poa arachnifera*) with the high turf quality and apomictic mode of reproduction from Kentucky bluegrass (*Poa pratensis*) by interspecific hybridization. Crosses were made in the greenhouse in 2009. Eleven hybrids were selected from Texas x Kentucky (TX x KY) F₁ or (TX x KY) x KY BC₁ crosses after two or three rounds of single plant selections from open pollinated plants in field based evaluation nurseries (Table 1). A portion of these hybrids (#21, #57, #67, #71, #87, TK24-SPS) were previously tested in small scale outdoor seeded trials under low management conditions without supplemental irrigation after establishment. Hybrid #67 and #57 produced the best turf quality when conditions were optimal, similar to the Kentucky checks. When conditions became hot and dry, hybrid #67 remained green longer than the Kentucky checks. This year all the hybrid selections were evaluated in a greenhouse trial and a portion in a small field trial. The greenhouse trial was seeded on 12-1-16 at a rate of 200 mg / 4" pot in a randomized complete block design (RCB) with three replications. Plants were cut back on a weekly basis starting on 12-20-16 and fertilized with liquid 24-8-16 every 7 to 10 days. The hybrids were generally slower to emerge than the checks Thermal blue and Baron at two weeks after seeding (Table 1). At approximately eight weeks after seeding (2-10-17) hybrid #67 had the highest turf quality rating of all the hybrids which ranged from 5.3 to 7.3. A genetic color rating on this date indicated hybrids #67, TK24-SPS, #87, and #21 received the darkest color ratings, although not significantly different from many of the other entries tested (Table 1, Figure 1). The hybrids were also seeded outdoors in 2' x 2' plots on 10-19-16 at a 3X (11.5g / plot) rate in a RCB with two replications. In two cases (#67, #174), seeds harvested in 2015 and 2016 were tested. Plots were irrigated when conditions became dry. Two weeks after seeding, emergence ratings were high for hybrids #263, #87, #174 which ranged from 6 to 7 (Table 2, Figure 1d). Most of the other hybrids displayed good emergence (rating 4 to 5) and were not significantly different from #87 or #174. Hybrid #71 and #261 displayed the slowest emergence (rating 2 to 3.5). Slight, non-significant differences were observed between seed lots harvested in 2015 and 2016 which could be the result of residual dormancy present in the 2016 seeds. Turf quality ratings ranged from 3.5 to 7.5 when rated in Dec, May, and Aug (Figure 2). A portion of the remaining seed from the hybrids was used to establish larger seed increase plots at Woodward ARS (Figure 3). The rest of the seed was sent to Oklahoma State University to be tested on a larger scale for turf quality and for resistance to diseases common to Kentucky bluegrass.

Summary:

Under greenhouse conditions all selections produced an attractive turf approximately 6 to 8 weeks after seeding

Larger scale seed production plots were planted in the spring of 2017 at Woodward ARS

Seeds were also sent to OSU to be tested in larger trials where disease pressure not present at Woodward will be present (planting scheduled for week of Sept 18th 2017).

Table 1. Emergence, turf quality, and genetic color of hybrids seeded on 12-1-16 in the greenhouse

Entry	Emergence (1 _{slow} - 9 _{fast})		Turf Quality (1 _{worst} - 9 _{best})				Color (1 _{light} - 9 _{dark})
	12-15-16	12-30-16	1-19-17	2-10-17	3-2-17	3-23-17	2-10-17
Baron - Kentucky Check	6.3	7.7	9.0	8.7	9.0	7.3	5.0
Thermal Blue - Hybrid Check	5.7	7.7	7.7	8.0	8.7	8.0	5.7
WL63 _(TX) x Russian _(KY) - #87	4.0	5.3	6.3	7.0	7.0	7.0	6.0
TK26 _(TK) x Scenic _(KY) - #160	4.0	4.0	5.3	6.7	6.3	5.3	5.3
TK24 _(TK) x Huntsville _(KY) - #67	4.0	3.3	5.7	8.0	8.0	8.0	6.0
TK26 x Scenic - #36:1	3.3	3.3	5.0	5.7	6.0	5.0	4.7
TK43 _(TK) x Trenton _(KY) - #263	3.0	4.0	5.7	6.3	6.7	6.0	5.3
TK43 x Trenton - #261	3.0	3.3	5.7	6.7	8.0	7.3	5.7
TK24 x Huntsville - #71	3.0	2.3	3.7	5.3	6.0	6.0	5.0
TK24 single plant selection (SPS)	3.0	3.3	5.7	7.3	8.3	7.3	6.0
TK43 x Trenton - #57	3.0	2.3	4.7	7.0	7.3	7.0	4.7
Bandera - Hybrid Check	2.7	6.7	8.3	8.0	9.0	7.7	5.3
TK43 x Trenton - #174	2.7	2.7	4.7	6.7	7.0	6.3	5.0
Midnight Kentucky Check	2.3	4.7	6.3	7.0	7.7	7.7	5.7
D4-10 _(TX) x Poland _(KY) - #21	2.0	2.0	4.0	7.0	7.7	7.0	5.7
LSD*	1.1	1.1	0.96	0.93	0.99	1.4	0.75

*Least Significant Difference ($\alpha = 0.05$)**Table 2.** Emergence and turf quality of hybrids seeded on 10-19-16 in 2' x 2' field plots

Entry*	Emergence (1 _{slow} - 9 _{fast})		Turf Quality (1 _{worst} - 9 _{best})	
	11-2-16	12-16-16	5-28-17	8-11-17
TK43 _(TK) x Trenton _(KY) - #263 (15)	7.0	6.0	6.5	5.5
WL63 _(TX) x Russian _(KY) - #87 (15)	6.0	6.0	5.0	4.0
TK43 x Trenton - #174 (15)	6.0	7.0	6.0	5.0
TK26 _(TK) x Scenic _(KY) - #160 (16)	5.0	5.0	3.5	3.0
TK43 x Trenton - #174 (16)	4.5	4.5	6.0	5.0
TK24 _(TK) x Huntsville _(KY) - #67 (15)	4.5	4.0	4.5	5.5
TK24 _(TK) x Huntsville _(KY) - #67 (16)	4.0	4.5	4.5	5.5
D4-10 _(TX) x Poland _(KY) - #21 (15)	4.0	3.0	7.5	6.5
TK43 x Trenton - #57 (15)	4.0	5.0	7.0	5.0
TK24 x Huntsville - #71 (15)	3.5	3.5	5.0	6.0
TK43 x Trenton - #261 (16)	2.0	3.5	6.5	5.0
LSD**	2.05	1.63	1.76	2.1

*Numbers in parenthesis = seed harvest year, 2015 or 2016

**Least Significant Difference ($\alpha = 0.05$)

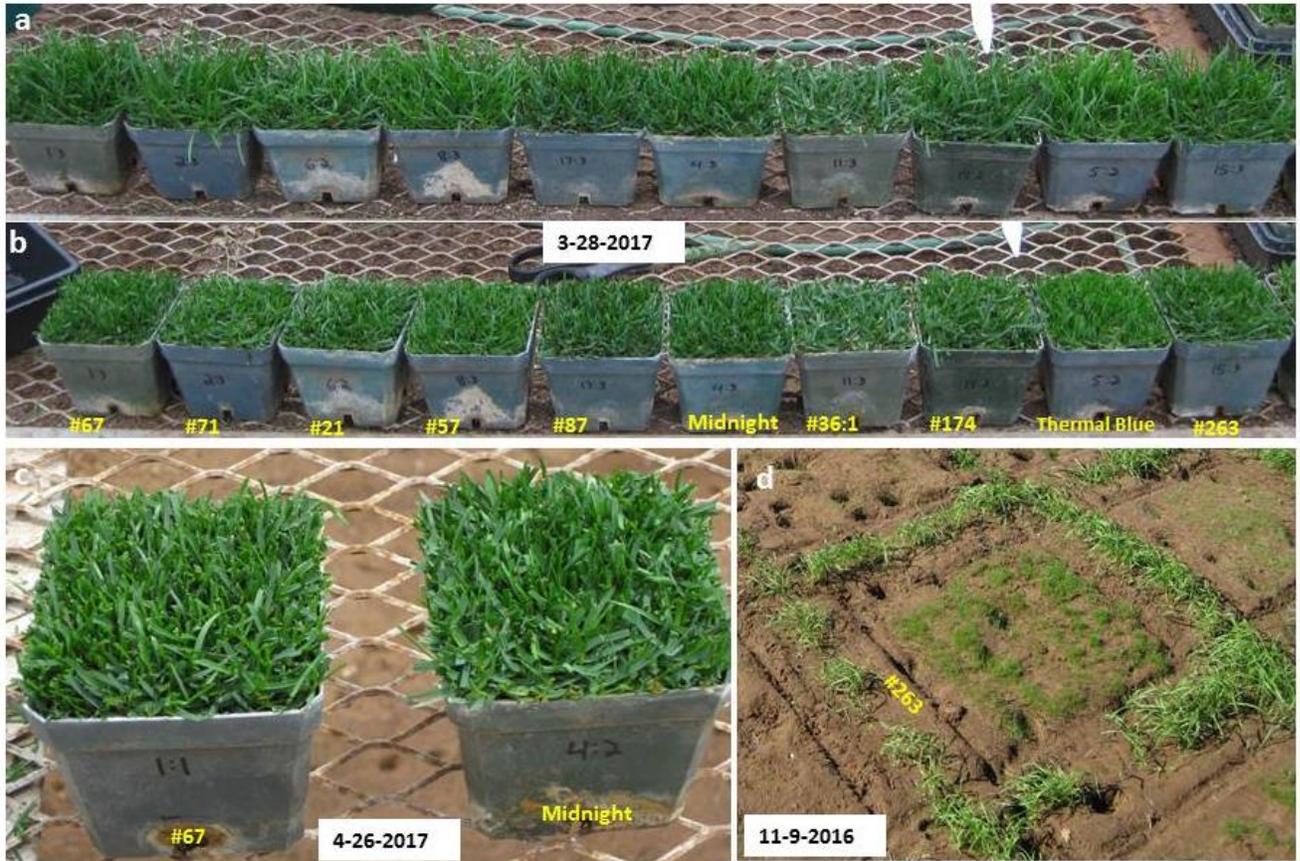


Figure 1. A portion of the hybrids in the greenhouse trial on 3-28-17 before (a) and after (b) being cut back. Midnight Kentucky bluegrass and hybrid #67 after being cut back on 4-26-17 (c). A plot of hybrid #263 three weeks after seeding (d). Wheat was used as a border and the holes are from deer that walked through the plots when they were covered with a turf-cover tarp during germination.



Figure 2. A portion of the hybrids in the outdoor trial on 9-13-17.



Figure 3. Seed increase nursery planted in the spring from plants started in the greenhouse. Plots contain 400 plants / entry. Entries included #57 (1 plot), #67 (3 plots), #71 (1 plot), #87 (2 plots), #160 (1 plot), #174 (1 plot), #261 (2 plots), #263 (2 plots), TK24-SPS (2 plots), #36:1 (1 plot), and #21 (1/2 plot).