

Evaluation of native and traditional turfgrass species for low maintenance lawns

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Objectives

The goal of this research is to determine the adaptation potential of several low-maintenance turfgrass species and mixtures to southern Idaho over two years of a low maintenance regime.

Methods

On July 16, 2008, one half of the plots were left un-mowed and the other half was mowed at a height of 3.5 inches. Up until this date, all plots were mowed at 3.5 inches and clippings removed in order to combat weed encroachment. Plots have been irrigated at 70 % ET replacement. A 70% sulfur coated urea fertilizer was applied at the rate of 1 lb N/1000 ft² on September 15. On November 7th, the entire area was mowed at 3.5 inches in order to reduce weed competition and to aid in the prevention of snow mold.



Overview of turf plots on June 25, 2008.

1ST YEAR RESULTS & DISCUSSION

Traditional Turfgrass Species

Bluegrasses. The KBG treatment was a blend composed of equal percentages of ‘Nugget,’ ‘Wildhorse,’ ‘Midnight,’ and ‘Avalanche.’ As expected KBG was slow to emerge and establish.

Seedling vigor was low and did not reach full ground cover until the end of July of 2008 (Tables 1 and 2). This slow establishment rate resulted in relatively high weed competition in the spring of 2008 (Table 3). Hybrid bluegrass, a cross between KBG and Texas bluegrass, was similar to KBG, except that it did seem to fill in slightly faster during 2008 and provided virtually complete ground cover by the end of the year whereas KBG still had about 9% of the ground showing. This higher ground cover and increased density resulted in slightly higher quality scores in 2008 (Table 5).

Fescues. The tall fescue blend is an equal combination of the varieties ‘Coyote II,’ ‘Fidelity,’ and ‘GreensKeeper.’ Tall fescue also performed as expected with high seedling vigor (Table 1) and fast establishment rate (Table 2). As a result of this vigorous establishment, tall fescue was able to effectively compete against weed encroachment (Table 3). The fine fescue complex is composed of several species including chewings (*Festuca rubra* ssp. *littoralis* and ssp. *rubra*), chewings (*F. rubra* ssp. *commutata*) hard (*F. trachyphylla*), and sheep (*F. ovina*). All of these fine fescues have been described as tolerating low fertility soils and drought and all have excellent shade tolerance. Sheep fescues have traditionally been used primarily as a very low maintenance grass species for soil stabilization due to its lower turf quality compared to the other fine fescues. Seedling vigor was similar among the fine fescues and ground cover as a result was fairly similar (Tables 1 and 2). Hard fescue was a little slower to establish as it entered the winter of 2007/2008 with the lowest ground cover of the fine fescues. By June 25 of 2008, all had over 80% ground cover. As a result of the rapid establishment, the fine fescues also controlled weeds quite well with the mix performing the best (Table 3). The fine fescue mix is an equal combination of creeping red, chewings, and hard fescue. Chewings and hard fescue provided the most consistent dark green color throughout the year while creeping red and sheep fescue were lighter green (Table 4). The creeping red fescue variety ‘Boreal’, is an older variety and other, darker green varieties exist. In terms of turf quality, chewings and creeping red fescue provided the highest scores throughout most of the year (Table 5). Shoot density and the resulting reduced weed competition were factors in influencing turfgrass quality scores.

Non-traditional Turfgrass Species

Idaho Fescues. Although part of the larger fine fescue complex, Idaho fescue (*Festuca idahoensis*), native to North America, has not traditionally been used in common turfgrass situations. The foliage is generally a light blue-green, but the adaptation to shade, cold and drought is similar for Idaho fescue as the other fine fescues. The seedling vigor and establishment rate for the Idaho fescues was quite low compared to the other fine fescues (Tables 1 and 2). As a result of the slow establishment rate, weed encroachment was quite high (Table 3). The Idaho fescues did not reach over 90% ground cover until early September and weed encroachment was still relatively high compared to the fine fescues. Mowing only slightly reduced weed competition for the variety ‘Joseph’ and less so for ‘Nez Perce’ (Table 3). Color was similar for both Idaho fescue varieties with both possessing a dark blue-green color (Table 4). The slow establishment rate led to high weed densities for both varieties resulting in unacceptable turfgrass quality ratings throughout the year (Table 5).



Idaho fescue foliage color compared to fine fescue and Kentucky bluegrass (KBG). Mowed portion of plots is on the right.

Wheatgrasses. The wheatgrasses have long been used for erosion control and soil stabilization with only a few species having some use as turfgrasses. Of the wheatgrasses in this study, only western wheatgrass (*Pascopyrum smithii*) is considered native to North America. Except for tall fescue, the wheatgrasses provided the highest seedling vigor and establishment rates resulting in very little weed competition compared to the other cool-season species in the trial. Of the four wheatgrasses, streambank had the highest seedling vigor, followed by Siberian (Table 1). Streambank wheatgrass also had the fastest ground cover of all the wheatgrasses, nearing 100% by the end of July (Table 2). Additionally, streambank had the lowest weed density throughout the growing season. Siberian was perhaps the least effective among the wheatgrasses in competing against weed (Table 3). Compared to the fescues and bluegrass species, the wheatgrasses are lighter in color, but still provided adequate green color when compared to the warm-season grasses blue grama and buffalograss (Table 4). On some occasions, some of the wheatgrasses were even comparable in color to sheep fescue. Western, Siberian and streambank wheatgrass were most susceptible to leaf shredding upon mowing. Tough vascular bundles in the leaves leave a whitish-gray and stringy appearance upon mowing, especially during the summer. This caused the green color scores to be noticeably lower with mowing as compared to the un-mowed portion of the plots (Table 4). Crested wheatgrass was least prone to shredding, but did not seem to diminish the overall problem in mixtures with the wheatgrasses more prone to this problem. All the wheatgrasses provided very good turfgrass quality the initial year of establishment (Table 5). Only the mixture of crested + Siberian wheatgrass failed to reach acceptable turfgrass quality in un-mowed plots during the 2008 growing season (Table 5). In the un-mowed treatments, quality scores were adjusted to reflect what might be expected in a 'natural' un-mowed, prairie-like state. Since all the wheatgrasses were very competitive against weeds and maintained a green cover with no leaf shredding in this state, they all approached acceptable quality in an un-mowed state. Upon mowing, however, the wheatgrasses undertook a 'stemmy' appearance as densities decreased during the summer. Siberian wheatgrass, perhaps due to its described finer leaves, provided the highest quality later in the year. The strong rhizomatous characteristics of western wheatgrass do not seem to be providing additional quality

characteristics to data such as improved density. This will be closely monitored in 2009 as well as the surprisingly good performance of Siberian wheatgrass.



Crested wheatgrass (WG) and Siberian WG grown side-by-side in research plots at Aberdeen R&E Center.

Blue Grama and Buffalograss. Both blue grama (*Bouteloua gracilis*) and buffalograss (*Buchloe dactyloides*) are warm-season grasses native to North America. Blue grama and the seeded buffalograss variety 'TopGun' have performed surprisingly well in terms of fast emergence, seedling vigor and establishment rate. These grasses along with the mixtures of blue grama and wheatgrasses and blue grama plus buffalograss were seeded in mid-July of 2007, so the seedling vigor and percent ground cover ratings should perhaps not be compared with the cool-season grasses in the trial. Regardless, blue grama and buffalograss 'TopGun' were the highest in terms of seedling vigor and percent ground cover heading into the winter of 2007/2008 (Tables 1 and 2). Blue grama alone and in mixtures with either western wheatgrass or buffalograss provided fairly good competition against weeds (Table 3). 'TopGun' on the other hand, was not as effective against weed competition due in part to the lower percent ground cover at the end of 2007 and the much lower cover in the spring of 2008 (Tables 2 and 3). The vegetatively propagated buffalograss varieties, 'Legacy' and 'Prestige,' were very slow to establish sufficient ground cover to compete against weeds and were almost completely overgrown with downy brome and purple mustard (Tables 2 and 3). Although the stolons arising from the plugs were quite aggressive, the leaf density was very low as they emerged from dormancy late in the spring of 2008. Mowing these vegetatively propagated varieties greatly enhanced their ability to compete with weeds as mowing reduced weed competition by over 50% (Table 3). This large reduction in weed competition upon mowing was the greatest reduction for any of the grass species in the trial. Blue grama provided more of a yellow-green color resulting in relatively low color scores throughout the year. Mixing blue grama with western wheatgrass did seem to improve color slightly, but the drastic differences in leaf texture (width of leaf blades), resulted in poor compatibility and low quality scores for most of the season. In an un-mowed state, however, the seedheads of the blue grama and taller leaf blades may provide a more acceptable, 'natural' look (Table 5). The seeded buffalograss alone and in combination with blue grama provided close to acceptable quality by early September especially in an un-mowed state, due also to the attractive seedheads of both blue grama and buffalograss. The vegetative buffalograss varieties were so over come with weeds that neither variety provided acceptable quality, even in a mowed situation (Table 5). These warm-season species go dormant much sooner and break dormancy much later in the spring that weed encroachment may be a perennial problem. The

buffalograss plots were sprayed with glyphosate in early December when all the foliage had gone dormant to combat weeds in order for us to evaluate the full potential of these grasses in 2009. When fully growing, the buffalograsses have color comparable to the wheatgrasses and their exceptional drought resistance warrants further study.

Prairie Junegrass and Muttongrass. Both prairie junegrass (*Koeleria macrantha*) and muttongrass (*Poa fendleriana*) are native to North America and adapted to dry climates. The junegrass variety 'Barkoel' has been evaluated for turfgrass with minimal maintenance with good color and density and has been available as sod under the trade name "Turtleurf." Both of these grasses have performed quite poorly to date in our trial due mainly to the extremely slow germination and establishment rates (Tables 1 and 2). As of early September, both grasses had approached 90% ground cover. As a result, weed competition was high in these grasses, and mowing did not greatly reduce weed competition since the grasses were so slow in growth, that the normal improved density seen with other grasses was not attained as the grasses were rarely tall enough to be mowed. Mowing did slightly decrease weed competition by simply reducing the competitiveness of the weeds (Table 3). Color is quite acceptable, but poor density and low ground cover never allowed these species to attain acceptable quality scores during the season (Table 5). The density of these grasses was improving by the end of the growing season and it is presumed that as they continue to grow and provide complete ground cover that these grasses will provide acceptable turfgrass quality in 2009.

As a result of this work in conjunction with other results from Utah State University, several of these species will be studied in more detail with respect to adaptation and competitive characteristics with results to provide insight for potential seed mixes. This trail will continue to be evaluated for seasonal color and quality.

Expenditure Report

The award for this work totaled \$3,753. This has been used for the purchase of a walk-behind mower to provide the mowing height treatments, and some has been used for labor to manage the plots and assist with species identification later this summer/fall. Additionally, one trip was taken to Logan, UT to visit with Dr. Paul Johnson to discuss this work and future work on native grass species evaluation. Remaining funds were used for hourly help to assist with plot maintenance.

Table 1. Seedling vigor ratings for grass species on September 10, 2007, at the Aberdeen R&E Center. Rating based on a 1-9 scale with 1 = very small, thin seedlings; 9 = large, thick seedlings.

Grass Species	Seedling Vigor
Kentucky bluegrass	2.0
Hybrid bluegrass	2.0
Tall fescue blend	5.5
Creeping red fescue	4.5
Chewings fescue	3.0
Hard fescue	3.0
Fine fescue mix	4.0
Sheep fescue	3.5
ID fescue 'Joseph'	1.5
ID fescue 'Nez Perce'	2.0
Crested wheatgrass	4.0
Western wheatgrass	4.5
Crested + western WG	4.0
Siberian wheatgrass	5.5
Crested + Siberian	6.0
Streambank wheatgrass	6.0
Blue grama	9.0
Blue grama + western WG	9.0
Buffalograss 'Top Gun'	8.5
Buffalo + blue grama	9.0
Buffalograss 'Legacy'	7.5
Buffalograss 'Prestige'	6.0
Prairie Junegrass	1.0
Muttongrass	2.0
LSD (0.05)	1.7

Table 2. Percent ground cover ratings for grass species during establishment and the first full year of growth at the Aberdeen R&E Center.

Grass Species	9/10/07	10/1/07	5/7/08	6/25/08	7/31/08	9/2/08
Kentucky bluegrass	8	18	25	75	95	91
Hybrid bluegrass	13	21	38	80	95	98
Tall fescue blend	48	81	81	91	98	99
Creeping red fescue	23	55	73	84	95	100
Chewings fescue	23	61	71	85	98	99
Hard fescue	23	46	64	84	96	98
Fine fescue mix	25	68	68	88	99	99
Sheep fescue	28	63	78	88	94	97
ID fescue 'Joseph'	8	16	44	65	88	95
ID fescue 'Nez Perce'	13	21	50	68	89	94
Crested wheatgrass	40	78	90	81	92	97
Western wheatgrass	18	29	54	76	89	93
Crested + western WG	30	71	86	84	90	95
Siberian wheatgrass	35	75	84	86	94	96
Crested + Siberian	40	79	88	89	90	95
Streambank wheatgrass	38	78	89	89	98	99
Blue grama	90	93	90	93	98	98
Blue grama + western WG	83	90	90	95	96	98
Buffalograss 'Top Gun'	65	83	70	50	86	93
Buffalo + blue grama	85	89	88	90	98	97
Buffalograss 'Legacy'	38	40	29	44	86	92
Buffalograss 'Prestige'	30	44	23	34	85	91
Prairie Junegrass	8	13	18	38	81	91
Muttongrass	8	15	21	39	79	89
LSD (0.05)	12	11	15	16	5	0.7

Table 3. Percent weed density ratings during the first full year of growth at the Aberdeen R&E Center. Density ratings based on percentage of plot infested with weeds.

Grass Species	6/25/08	7/31/08	9/2/08	
			Mowed	Not Mowed
Kentucky bluegrass	48	18	11	16
Hybrid bluegrass	44	13	8	18
Tall fescue blend	15	2	1	4
Creeping red fescue	28	9	6	11
Chewings fescue	39	9	6	13
Hard fescue	36	13	13	16
Fine fescue mix	21	4	6	8
Sheep fescue	26	13	13	19
ID fescue 'Joseph'	76	27	18	35
ID fescue 'Nez Perce'	60	25	21	29
Crested wheatgrass	13	7	8	11
Western wheatgrass	38	11	10	16
Crested + western WG	16	10	9	11
Siberian wheatgrass	11	13	20	26
Crested + Siberian	9	9	18	23
Streambank wheatgrass	13	2	4	6
Blue grama	21	14	14	28
Blue grama + western WG	14	9	14	20
Buffalograss 'Top Gun'	79	40	25	41
Buffalo + blue grama	18	14	14	26
Buffalograss 'Legacy'	90	61	29	65
Buffalograss 'Prestige'	90	59	29	64
Prairie Junegrass	74	44	23	36
Muttongrass	81	44	21	44
LSD (0.05)	18	7	na	na

Table 4. Color ratings for grass species during establishment and the first full year of growth at the Aberdeen R&E Center. Color ratings based on a 1-9 scale with 1 = straw brown turf; 9 = deep, dark green turf.

Grass Species	10/1/07	6/25/08	7/31/08	9/2/08		9/15/08	10/31/08
				Mowed	Un-Mowed		
Kentucky bluegrass	7.5	6.0	7.6	8.0	7.5	6.8	5.9
Hybrid bluegrass	7.5	6.3	7.6	7.8	7.3	6.9	6.0
Tall fescue blend	7.3	7.0	7.6	7.8	7.3	7.0	6.5
Creeping red fescue	7.5	6.3	6.8	7.0	7.0	7.0	6.3
Chewings fescue	7.8	6.3	7.4	8.0	8.3	7.9	8.1
Hard fescue	7.5	6.5	7.8	8.5	8.9	8.0	7.9
Fine fescue mix	7.8	6.5	7.0	8.0	7.5	7.4	7.3
Sheep fescue	6.8	5.5	6.8	6.8	6.8	6.4	6.3
ID fescue 'Joseph'	8.0	6.5	6.5	7.0	7.3	6.9	6.6
ID fescue 'Nez Perce'	7.8	6.5	7.3	7.0	7.5	6.9	6.0
Crested wheatgrass	7.3	6.3	5.9	5.3	5.8	5.6	6.0
Western wheatgrass	7.0	6.0	5.5	5.5	6.8	5.9	4.4
Crested + western WG	7.0	6.5	5.6	5.5	6.3	5.8	5.8
Siberian wheatgrass	7.3	5.8	4.5	5.3	6.5	6.3	6.6
Crested + Siberian	7.3	6.0	4.1	5.0	6.0	6.0	6.1
Streambank wheatgrass	7.3	6.0	4.1	4.3	6.0	5.4	4.0
Blue grama	5.3	5.5	5.6	5.5	6.0	4.4	1.5
Blue grama + western WG	6.0	6.0	5.5	6.0	6.8	4.9	2.9
Buffalograss 'Top Gun'	7.5	6.0	6.3	6.3	6.3	5.6	1.0
Buffalo + blue grama	5.3	5.0	5.3	5.0	5.5	3.9	1.5
Buffalograss 'Legacy'	6.8	6.0	6.0	5.8	5.8	4.8	1.0
Buffalograss 'Prestige'	6.5	6.0	6.0	6.0	6.0	5.1	1.0
Prairie Junegrass	7.8	6.8	7.3	7.5	7.5	6.5	5.4
Muttongrass	7.8	6.5	6.8	7.3	7.3	6.9	6.5
LSD (0.05)	1.1	0.9	0.6	na	na	0.8	0.9

Table 5. Quality ratings for grass species during establishment and the first full year of growth at the Aberdeen R&E Center. Quality ratings based on a 1-9 score with 1 = very poor, thin, yellow turf; 6 = minimally acceptable turf; 9 = excellent turf with good density, color and uniformity.

Grass Species	6/25/08	7/31/08	9/2/08	
			Mowed	Un-mowed
Kentucky bluegrass	3.8	5.6	6.3	6.0
Hybrid bluegrass	3.8	6.8	6.8	6.3
Tall fescue blend	5.8	6.5	6.8	6.0
Creeping red fescue	4.8	6.8	7.3	7.8
Chewings fescue	5.0	6.9	7.3	7.5
Hard fescue	4.3	6.3	6.8	7.5
Fine fescue mix	5.5	6.8	7.0	7.5
Sheep fescue	4.8	6.4	6.0	6.8
ID fescue 'Joseph'	2.3	4.1	4.8	6.0
ID fescue 'Nez Perce'	2.3	4.6	4.8	5.5
Crested wheatgrass	4.8	5.1	5.5	5.8
Western wheatgrass	3.3	4.3	4.3	6.8
Crested + western WG	4.8	4.8	5.0	6.3
Siberian wheatgrass	4.5	4.3	4.8	5.8
Crested + Siberian	5.3	4.3	5.3	5.5
Streambank wheatgrass	5.3	4.0	4.0	6.5
Blue grama	5.5	5.9	5.8	6.0
Blue grama + western WG	4.0	5.0	5.8	7.0
Buffalograss 'Top Gun'	1.3	3.1	4.5	5.5
Buffalo + blue grama	5.3	5.6	5.0	6.0
Buffalograss 'Legacy'	1.0	3.4	4.3	3.3
Buffalograss 'Prestige'	1.0	2.8	4.5	3.0
Prairie Junegrass	1.5	3.5	4.5	4.8
Muttongrass	1.8	3.1	4.3	4.5
LSD (0.05)	1.0	0.7	na	na