

Kentucky Bluegrass Germplasm for Sustainable Seed Yield

INTRODUCTION

A ban on open-field burning of Kentucky bluegrass (*Poa pratensis* L.) post-harvest residue has been implemented in Washington and restrictions are in place in Idaho and Oregon. Without post-harvest burning seed yield decreases over time (Lamb and Murray, 1999), which has forced growers to use shorter rotations to maintain yield. In a multi-year study we have identified germplasm that has improved seed production without burning (Johnson et al., 2003), reselected within that germplasm (Johnson et al., 2010), and established turfgrass and seed production trials (Dodson, 2008) that have been evaluated over several years (Johnston et al., 2012, 2013).

OBJECTIVE

Identify high yielding turf-type Kentucky bluegrass germplasm that can be grown for several years without open-field burning of post-harvest residue.

MATERIALS & METHODS

This long-term study initially evaluated 228 bluegrasses from the USDA-ARS Kentucky bluegrass collection at Pullman, WA (Fig. 1; Johnston et al., 1997). The selected eight PI accessions (plus two checks, 'Kenblue' and 'Midnight') represent germplasm that has good seed yield without field burning while maintaining turfgrass quality (Fig. 2 and 3). Yield parameters were evaluated over a 2-yr period and individual plants were selected within each accession, or check, with the highest seed weight, highest seed panicle⁻¹, highest panicles area⁻¹, and highest seed yield (Fig. 4). These 40 selections plus base population seed from the USDA-ARS collection were planted in turf plots in 2006 (Fig. 5) and non-irrigated and irrigated seed production plots in 2007 at Pullman, WA (Fig. 6). Turfgrass trials were evaluated according to National Turfgrass Evaluation Program protocol. Seed production plots were harvested (2008-2011), threshed, cleaned, and seed yield was determined. The 40 selections were culled over several years and the 4-yr means of seed yield vs. turfgrass quality for the remaining selections are presented (Table 1). Seed increase plots (Fig. 7) were established in 2011 and harvested 2012 – 2014 (Table 2).



Fig. 1 USDA-ARS Kentucky bluegrass collection evaluation.



Fig. 2 Seed plot treatments: burning; baling; full residue.



Fig. 3 Turfgrass evaluation: turf quality; texture; color; etc.



Fig. 4 Space-plant nursery for individual plant characterization.



Fig. 5 Turfgrass evaluation at Pullman, WA.



Fig. 6 Seed production evaluation at Pullman, WA.



Fig. 7 Seed increase at Pullman, WA, June 2013.

Table 1. Non-burn Kentucky bluegrass germplasm turfgrass quality and seed yield.

Cultivar or PI	Selection parameter	Turfgrass quality*		Seed yield (kg ha ⁻¹)	
		5-yr mean Pullman	3-yr mean Puyallup	4-yr mean Dryland	4-yr mean Irrigated
Midnight	Elite-type check	7.1 a**	5.3 a	152 c	272 d
Kenblue	Common-type check	5.3 c	4.7 b	446 b	681 c
Kenblue	Seed panicle ⁻¹	5.4 c	4.4 b	890 a	1114 ab
371775	Seed panicle ⁻¹	6.1 b	5.4 a	452 b	896 bc
368241	Panicles area ⁻¹	5.1 d	4.7 b	1000 a	1234 a

*Turfgrass quality rated 1 to 9; 9 = excellent.

**Means within columns followed by the same letter are not significantly different. LSD P = 0.05.

Table 2. Seed increase plots seed yield, Pullman, WA.

Cultivar or PI	Dryland or Irrigated	Seed yield (kg ha ⁻¹)		
		2012	2013	2014
Kenblue	Dryland	1355	1023	1005
371775	Irrigated	819	1025	943
368241	Dryland	1049	776	475

RESULTS, OUTCOMES, AND CONCLUSIONS

Evaluation of the USDA-ARS Kentucky Bluegrass Collection

- Agronomic data could be used to differentiate among accessions.
- A Kentucky bluegrass core was developed (Johnston et al., 1997).

Residue Management and Turf Evaluation

- Accessions were identified that maintained good seed yield when post-harvest residue was baled and possessed good turfgrass quality (Johnson et al., 2003).

Selection for Diversity in Seed Yield Components

- Variation between and within accessions was identified (Johnson et al., 2010), so the potential exists for plant selection and enhancement.

Turfgrass and Seed Production Trials

- Selection for seed yield components had a variable response; seed yield was primarily dependent on accession (Dodson, 2008).
- PI 368241, selection panicles area⁻¹, and Kenblue, selection seed panicle⁻¹, had good seed yield both irrigated and non-irrigated and fair turfgrass quality. PI 371775, selection seed panicle⁻¹, had good turf quality and good yield with irrigation (Table 1).

Seed Increase and Germplasm Release

- Seed increase plots were harvested in 2012 – 2014 at Pullman, WA.
- Germplasm will be released by 2015.

LITERATURE CITED

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