

Kentucky Bluegrass Germplasm Evaluation for Seed Production without Open-field Burning

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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.

OBJECTIVE

Develop a high yielding turf-type Kentucky bluegrass that 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 of post-harvest residue while maintaining turfgrass quality (Fig. 2 and 3). Agronomic 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 remnant seed obtained from the USDA-ARS collection (base population) were planted in turf plots in 2006 (Fig. 5) and non-irrigated and irrigated seed production plots in 2007 at Pullman, WA (Fig. 6). There were 150 plots in each trial (50 entries x 3 replications). The turfgrass trial was evaluated monthly during the growing season (2007 to 2010) according to National Turfgrass Evaluation Program (NTEP) protocol. From 2008 to 2011, seed production plots were harvested, 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 (Fig. 7 and 8).



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.

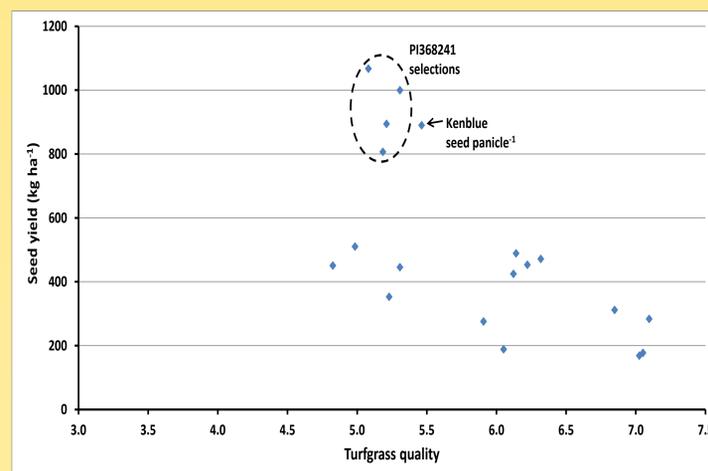


Fig. 7 Non-irrigated Kentucky bluegrass seed yield (2008-2011) vs. turf quality (2007-2010; 1 to 9; 9 = excellent quality) at Pullman, WA.

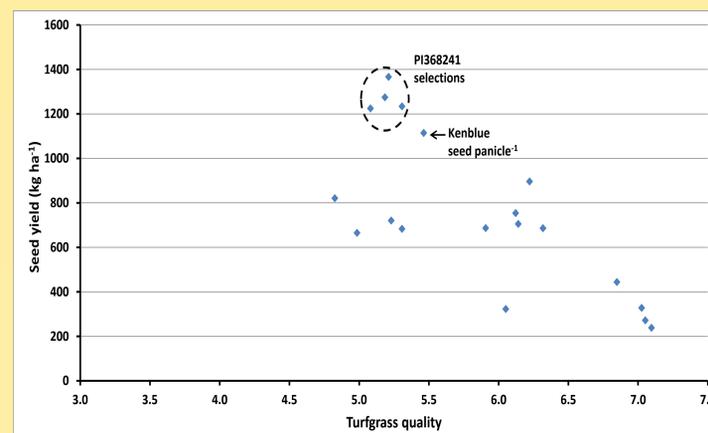


Fig. 8 Irrigated Kentucky bluegrass seed yield (2008-2011 vs. turf quality (2007-2010; 1 to 9; 9 = excellent quality) at Pullman, WA.

RESULTS

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 turf quality (Johnson et al., 2003).

Selection for Diversity in Seed Yield Components

- Variation between and within accessions was identified (Johnson et al., 2010).

Turfgrass and Seed Production Trials

- A turfgrass evaluation trial was established at Pullman, WA (fall 2006). Plots were evaluated for turfgrass parameters, 2007 to 2010.
- Seed production trials (irrigated and non-irrigated) were established at Pullman, WA in 2007 and harvested 2008 to 2011.

OUTCOMES & CONCLUSIONS

- The USDA-ARS Kentucky bluegrass collection was evaluated for diversity and a core collection was developed.
- Accessions with good seed yield without post-harvest residue burning and good turfgrass quality were identified.
- Variation within accessions for seed production parameters was found, so the potential exists for plant selection and enhancement.
- Seed production and turfgrass trials were established and evaluations are on-going (2011 was 4th harvest).
- Selection for seed yield components had a variable response.
- PI 368241 and Kenblue selection for seed panicle⁻¹ show promise of being able to provide good turfgrass quality and seed yield under non-burn residue management (Fig. 7 and 8).
- Seed increase plots were harvested in 2012 for on-farm trials.

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