Kentucky Bluegrass Germplasm Evaluation for Non-burn Seed Production

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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, USA. 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, 2009), increased seed, and established turfgrass and seed production trials (Dodson, 2008). The trials will be evaluated over several years.

OBJECTIVES

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 AND 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). Current research focuses on 10 Kentucky bluegrass entries; eight are PI accessions and two are commercial cultivars ('Kenblue' and 'Midnight'). The selected PI accessions represent germplasm that has good seed yield without burning while maintaining turfgrass quality (Fig. 2 and 3). Several 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 seeds per panicle, highest panicles per unit area, and highest seed yield (Fig 4). These were planted into a seed increase nursery at Central Ferry, WA in late fall 2004. The seed increase nursery was harvested in 2006 and 2007 (Fig. 5). These 40 selections plus remnant seed obtained from the USDA-ARS collection (base population) were planted in turf plots in 2006 (Fig. 6) and seed production plots in 2007 at Pullman, WA (Fig. 7). There were 150 plots in each trial (50 entries x 3 replications).

The turfgrass trial was evaluated monthly (2007 and 2008) according to National Turfgrass Evaluation Program (NTEP) protocol. In 2008, seed production plots were harvested, threshed, cleaned, and seed yield was determined.

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 Harvesting bluegrass seed increase plots at the USDA-ARS research site at Central Ferry, WA

Fig. 6 Turfgrass evaluation at Pullman, WA

Fig. 7 Seed production evaluation at Pullman, WA

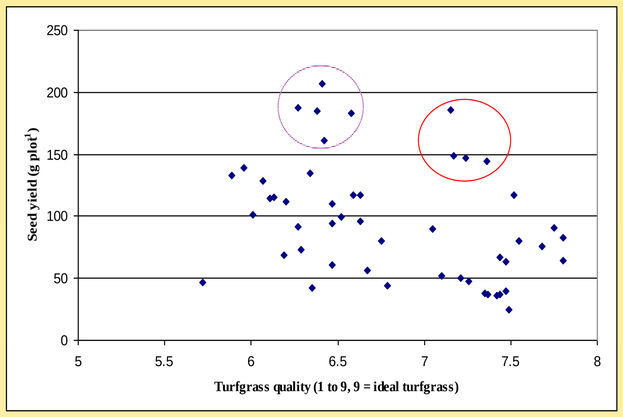

Fig. 8 Kentucky bluegrass seed yield (2008) vs. turfgrass quality (2007 and 2008 mean) for accession x selection components at Pullman, WA. Dashed circle are selections from accession PI 368241 and one selection from 'Kenblue'. Solid circle are selections from accession PI 371775.

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 (Johnston et al., 2005; Johnson, 2009).

Seed Increase

- The nursery at Central Ferry, WA was harvested (June 2006) and sufficient clean seed was obtained to carry out turf and seed production trials.

Turfgrass and Seed Production Trials

- A turfgrass evaluation trial was established at Pullman, WA (fall 2006). Plots are currently being evaluated for turfgrass parameters.
- Seed production trials were established at Pullman, WA in 2007. The 1st harvest occurred summer 2008 (Dodson, 2008).

OUTCOMES & CONCLUSIONS

- The USDA-ARS Kentucky bluegrass collection was evaluated for diversity and a core collection was developed.
- Accessions with good seed yield without burning and good turf quality were identified.
- Variation within accessions for seed production parameters was found, so the potential exists for plant selection and enhancement.
- Seed increase was completed and seed production and turfgrass trials were established and are on-going (2008 was 1st of four harvests).
- Selection for seed yield components had a variable response in 2008.
- Two PI accessions, PI 368241 and PI 371775, show promise of being able to provide good turfgrass quality and seed yield under non-burn management (Fig. 8).

LITERATURE CITED

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