Kentucky Bluegrass Seed Production without Field Burning while Maintaining Turfgrass Quality

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Introduction

A ban on open-field burning of post-harvest residue of grass seed production fields has been implemented in Washington, and restrictions are in place in Idaho and Oregon. Our previous research showed that, without post-harvest burning of residue, bluegrass seed yield decreased over time (Johnson et al., 2003). This has forced grass seed growers in the Pacific Northwest to use shorter rotations to maintain economically viable seed yields. What are needed are turf-type bluegrasses that will maintain high seed yield over several years without field burning of post-harvest residue.

Objectives

1. Assess the variation in agronomic attributes of selected bluegrass accessions and select different individual plant genotypes for: high seed weight, high seed panicle^{-1}, high panicles area^{-1}, and high overall seed yield using accessions with potential value in non-burn seed production.
2. Determine the selection response for grass seed yield and yield components by testing the resulting selections in Objective 1 for seed production under a residue removed (baled) management system over several years. In addition, test the selections for turfgrass quality over several years; turf trials currently ongoing at Pullman, WA, Puyallup, WA, and Auburn, AL.

Results and Discussion

This is a long-term, ongoing study. During prior research in 2004, seed yield components and seed yield data were obtained on 840 space plants at Pullman, WA. The data were analyzed for 1000 seed weight, seed panicle^{-1}, panicles cm^{-2}, and yield (g cm^{-2}). There was considerable variation between and within accessions, and we were able to identify the highest contributing single plant within each accession for each parameter (Johnson et al., 2010). In 2004, 100 plants of each selection x parameter and remnant seed of the original population for each accession were transplanted into a seed increase nursery at the USDA research site at Central Ferry, WA.

During 2006, the seed increase nursery (50 plots of 100 plants = 5000 plants) was evaluated for several agronomic traits and turfgrass potential (non-replicated data). In June 2006, the plots were harvested, air dried, threshed, and cleaned. Clean seed weight was obtained.

To evaluate turfgrass quality, a National Turfgrass Evaluation Program (NTEP) protocol turf trial was planted in August 2006 with the 50 entries in a RCB experimental design with three replications at the Washington State University (WSU) Turfgrass and

Agronomy Research Center (TARC) at Pullman, WA. Also, dryland and irrigated seed production plots (150 per trial) were established at the WSU TARC at Pullman, WA on 18 May and 17 Aug. 2007, respectively.

The turfgrass trial was evaluated monthly during the growing season according to NTEP protocol for establishment, turf quality, color, texture, chlorophyll index, and spring green-up (Dodson, 2008). Only turfgrass quality data will be presented.

In 2008, seed production plots were evaluated for seed yield, 1000 seed weight, seed yield plant^{-1}, seed panicle^{-1}, and panicles area^{-1}. Selection for seed yield components had a variable response and appeared to be dependent on accession (Dodson, 2008). In (harvest year 1), two accessions, PI368241 and PI371775 showed promise of being able to provide good turfgrass quality and seed yield under non-burn management (data not presented).

In 2009, non-irrigated and irrigated seed production plots were harvested for the second year. Turfgrass trials were evaluated for the third year. In 2009, as in 2008, the selection for yield components had a variable response and appeared to be dependent primarily on accession. Accession PI368241 continued to show promise of being able to provide good turfgrass quality and good seed yield under non-burn residue management (Fig. 1 and 2). Under non-irrigated seed production, selection within Kenblue for seed panicle^{-1} had good seed yield and turfgrass quality (Fig. 1).

In 2010, non-irrigated and irrigated seed production plots were harvested for the third year. Turfgrass trials were evaluated for the fourth year. PI368241 continued to show promise of being able to provide good turfgrass quality and good seed yield under non-burn residue management (Fig. 3 and 4). Under non-irrigated seed production, selection within Kenblue for seed panicle^{-1} had good seed yield and turfgrass quality (Fig. 3).

At Puyallup, WA, the same accessions and checks were planted 8 June 2010 in turfgrass plots at the Roy L. Goss Farm. In 2010, mean turfgrass quality ranged from 4.1 to 6.2 (quality rated 1-9; 9 = excellent). The selections of most interest, Kenblue seed panicle^{-1}, PI371775 seed panicle^{-1}, and PI368241 panicles area^{-1} had turfgrass quality of 4.3, 5.8, and 5.1, respectively. Gwen Stahnke is continuing to evaluate these plots during 2011.

It is critical to follow these studies for several additional (two or more) harvests to determine if a non-burn turf-type Kentucky bluegrass can be developed for sustainable grass seed production in the Pacific Northwest.

References Cited

Dodson, K.L. 2008. Development of Kentucky bluegrass (*Poa pratensis* L.) for non-burn seed production. M.S. thesis. Washington State Univ., Pullman, WA.

Johnson, R.C., W.J. Johnston, and C.T. Golob. 2003. Residue management, seed production, crop development, and turf quality in diverse Kentucky bluegrass germplasm. Crop Sci. 43:1091-1099.

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Fig. 1. Kentucky bluegrass non-irrigated seed yield vs. turfgrass quality (rated 1-9; 9 = excellent quality) at Pullman, WA, 2009. Note: To convert kg ha^{-1} to pounds per acre multiply by 0.9.

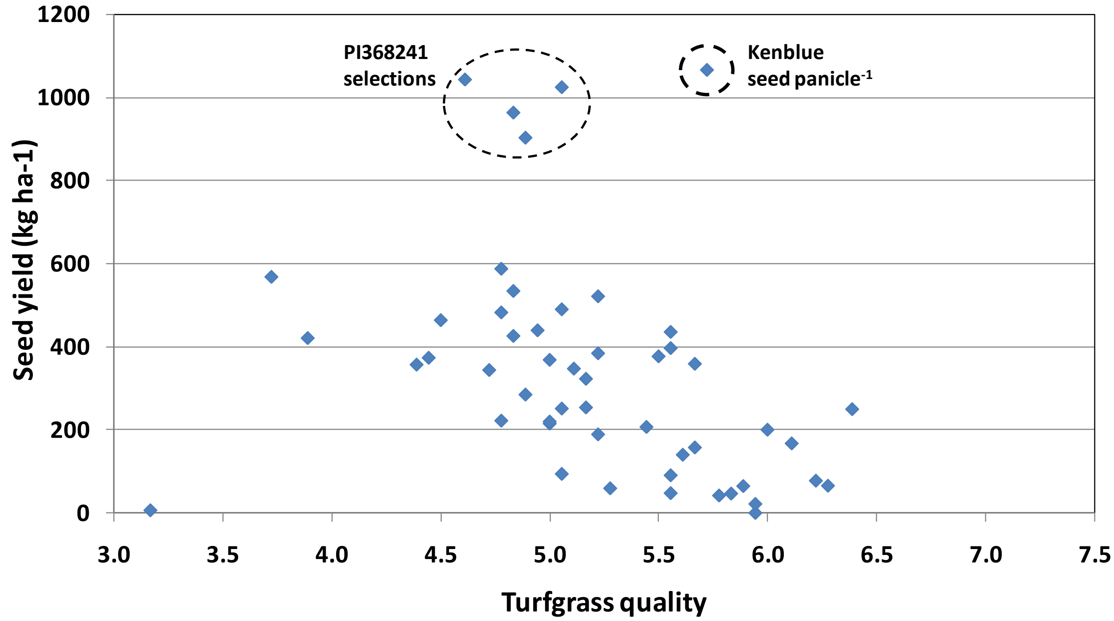

Fig. 2. Kentucky bluegrass irrigated seed yield vs. turfgrass quality (rated 1-9; 9 = excellent quality) at Pullman, WA, 2009. Note: To convert kg ha^{-1} to pounds per acre multiply by 0.9.

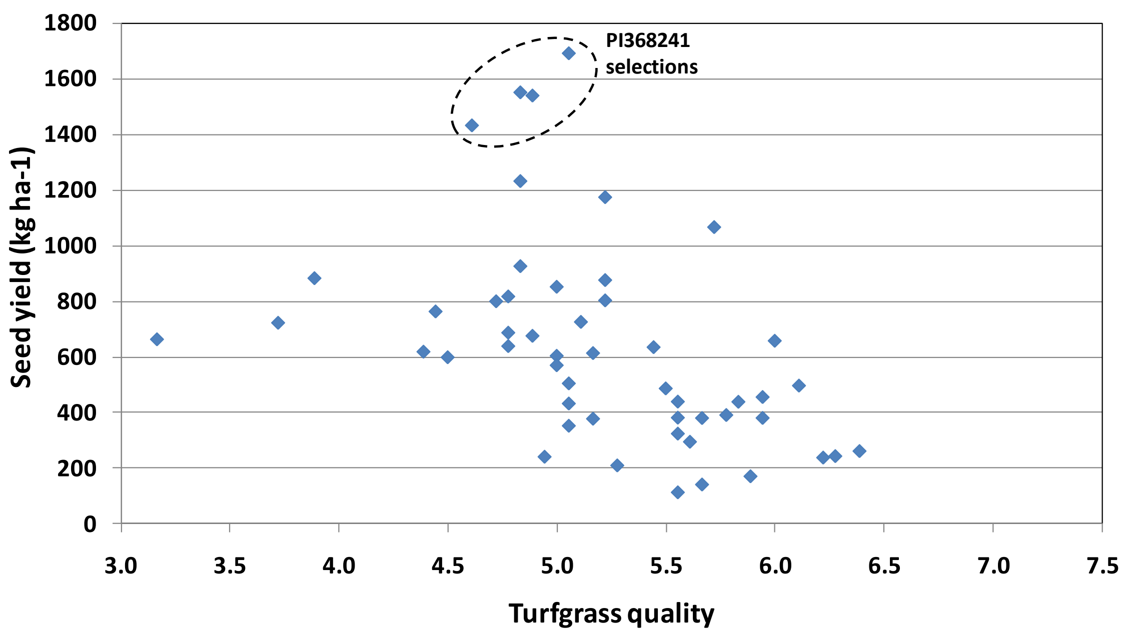

Fig. 3. Kentucky bluegrass non-irrigated seed yield vs. turfgrass quality (rated 1-9; 9 = excellent quality) at Pullman, WA, 2010. Note: To convert kg ha^{-1} to pounds per acre multiply by 0.9.

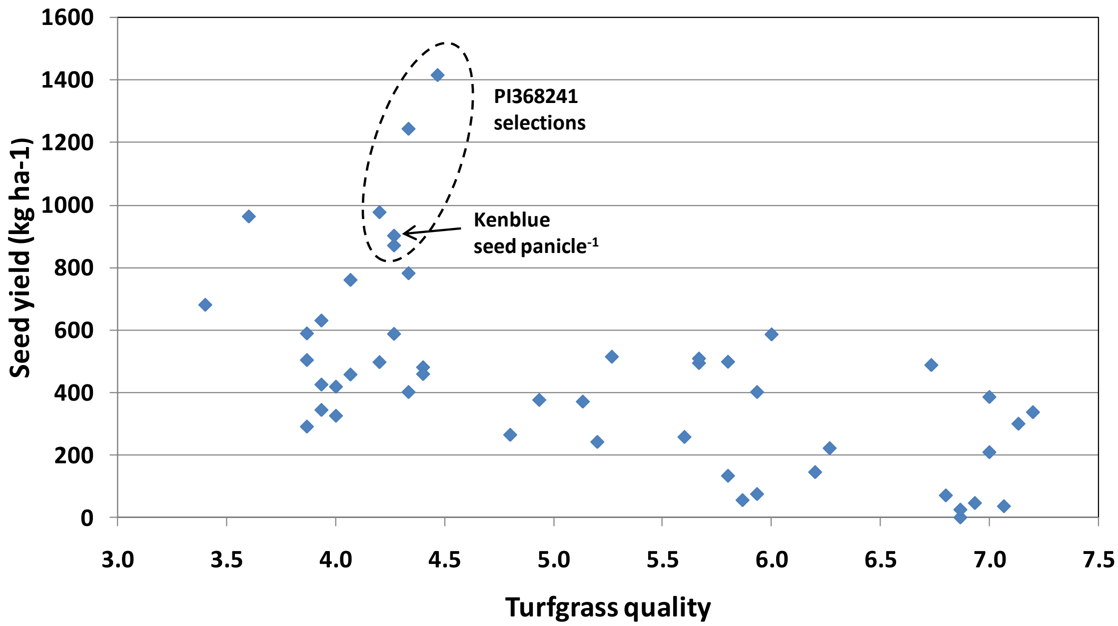

Fig. 4. Kentucky bluegrass irrigated seed yield vs. turfgrass quality (rated 1-9; 9 = excellent quality) at Pullman, WA, 2010. Note: To convert kg ha^{-1} to pounds per acre multiply by 0.9.