

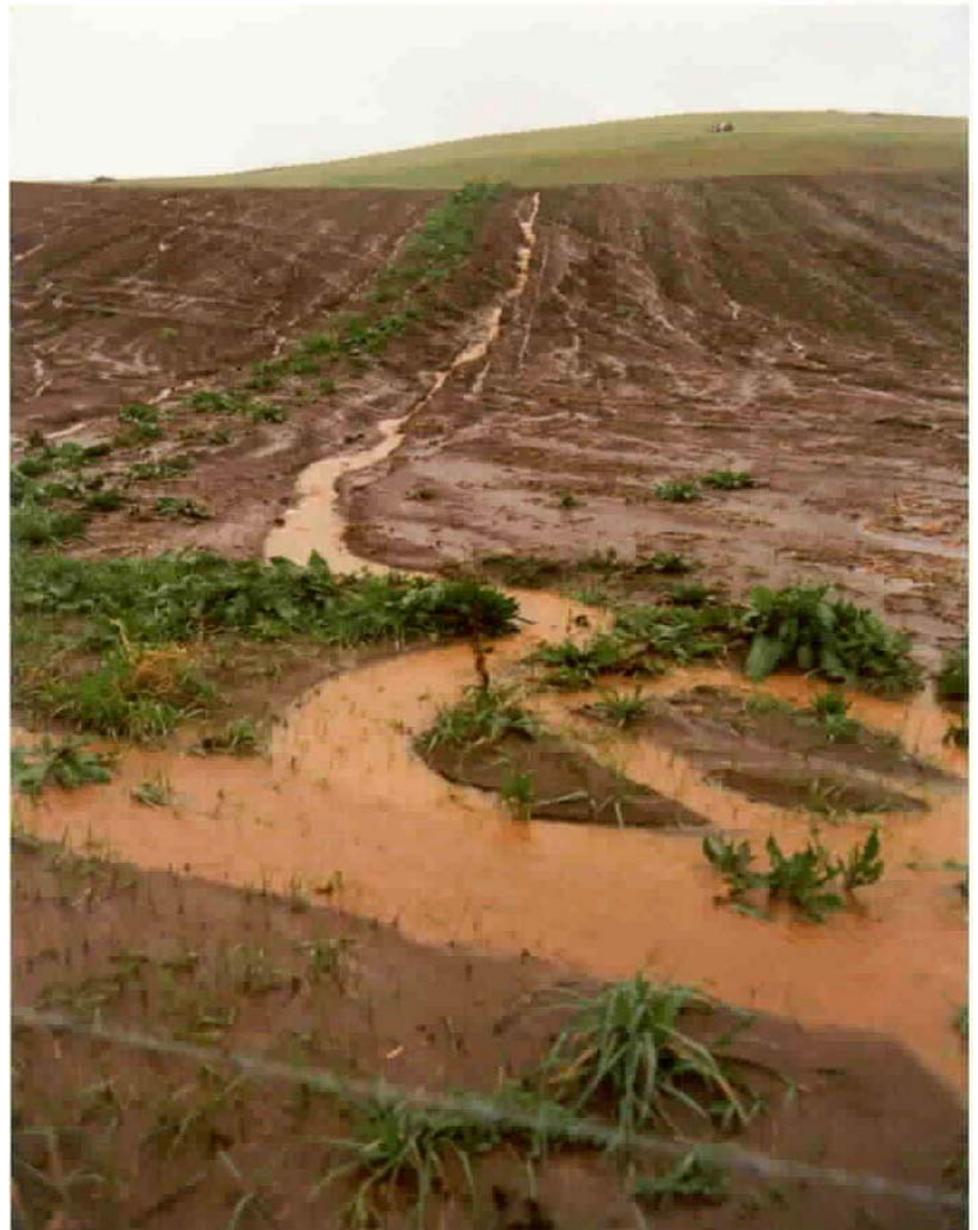
Development of Kentucky Bluegrass for Non-burn Seed Production

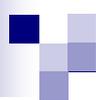
W. J. Johnston

K. L. Dodson

DOE ABPRTF February 10, 2009

Justification





2007-2009 Kentucky Bluegrass Non-burn Seed Production and Turfgrass Evaluation

Objectives

1. Identify Kentucky bluegrass germplasm that has good turfgrass quality while producing sustained seed yield under non-burn seed production
2. Evaluate effectiveness of seed yield component selection to enhance seed production

Germplasm Source

The 10 accessions studied came from previous work at WSU



1994-1995



1996-1999

Origin of Accessions:

PI230132	Iran
PI368241	Palmer, Alaska
PI539059	Siberia
Kenblue	donated by U. Kentucky
PI349188	Haines, Alaska
PI371775	Juneau, Alaska
Midnight	Oregon, donated by Pure Seed Testing
PI539057	Siberia
PI371768	Hope, Alaska
PI574523	(‘Belturf’)

Selection for Seed Yield Components

2002-2004



Selection was for plant with highest:

- **Panicles per area**
- **Seeds per panicle**
- **Seed weight**
- **Seed yield per plant**

Also original base population

Seed Increase at Central Ferry, WA

2004



2006



- Turfgrass and Agronomy Research Center, WSU, Pullman, WA
- Experimental design:
 - Turfgrass** – 50 entries planted in a randomized complete-block design with 3 replications
 - Seed Production** – split-plot design with whole plots being irrigation type and sub-plots being the 50 entries with 3 replications
- Seed production plots were established next to the Turfgrass evaluation plot

Turfgrass Trial at Pullman, WA

February 2007



- Planted 6 Sept. 2006
- Seeding rate of 11 g/m^2
(2.2 lb/1000 sq ft)
- Area of 2.25 m^2 for each
entry
(5 ft x 5 ft)

Turfgrass Evaluation

- Rated biweekly
- 1-9 scale, 9 = fully established
- July 17, 2007 majority of experimental units were established (i.e., received an 8 or 9)

May 2007



Turfgrass Evaluation

- Quality, color, and texture on a 1-9 scale (9 = best, darkest, or finest); rated monthly
- Chlorophyll taken monthly with a FieldScout CM chlorophyll meter (Spectrum Technologies, Inc.)

May 2008



Winter Damage

Vole Injury

1-9 scale; 9 = severe injury



Vole Injury

Greatest
PI 371768 and
Midnight

Least PI 539057
and PI 539059

March 2008

Snow Mold

% scale

PI 371768 > 20%

PI 539059 < 1%

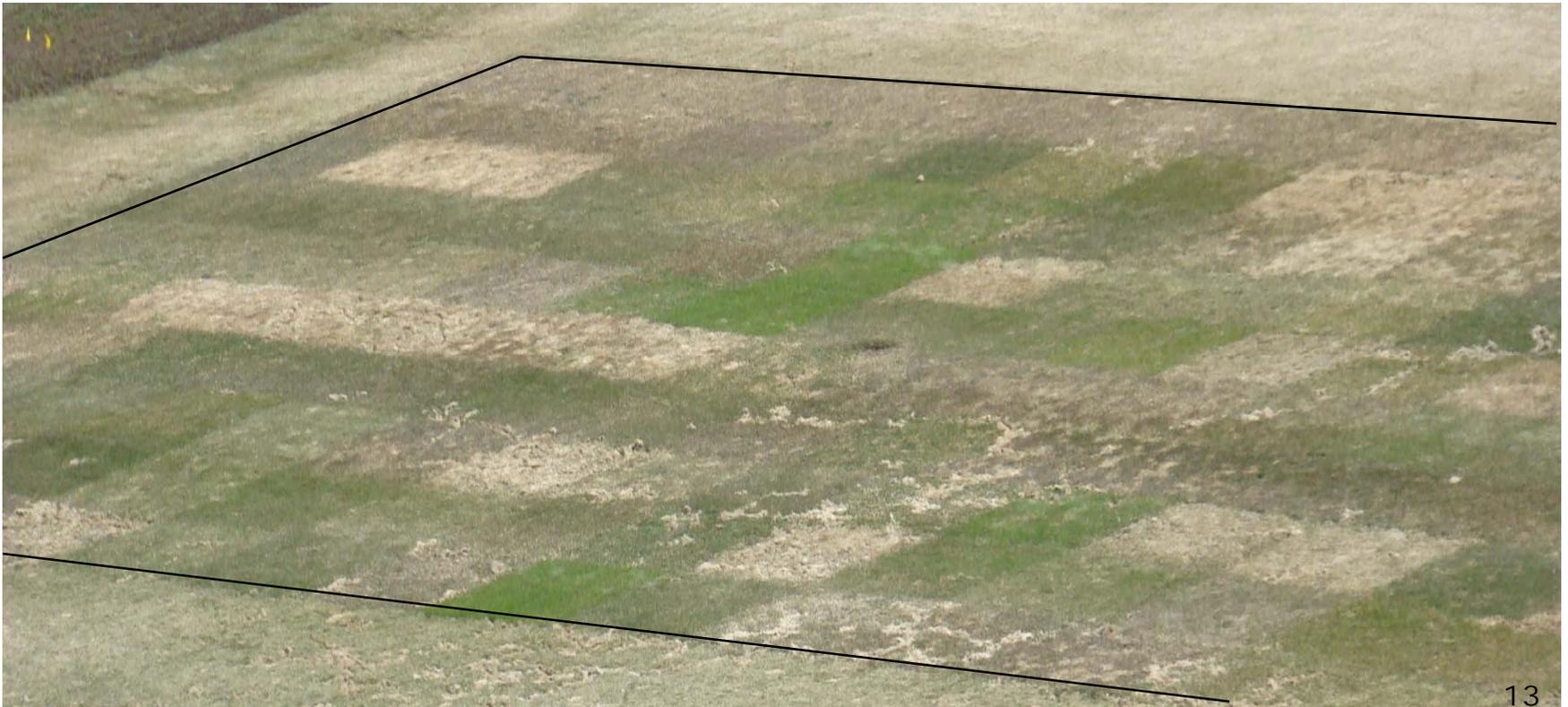


Spring Green-up

1 - 9 scale, 1 = brown, 9 = completely green

March, 2008

**PI 230132 fast spring green-up
and was the top yielding entry in
the previous studies of Nelson
(1996) and Johnston and
Johnson (various papers)**



Pearson correlation coefficients for Kentucky bluegrass turfgrass evaluation parameters at Pullman, WA, 2007 and 2008.

Turf factors‡	Quality†	Color†	Texture†	Chlorophyll†	Green-up	Establishment
Quality	1.00	0.95**	-0.53**	0.90**	-0.48**	-1.01ns
Color	0.95**	1.00	-0.61**	0.93**	-0.52**	-0.16ns
Texture	-0.53**	-0.61**	1.00	-0.58**	0.52**	0.13ns
Chlorophyll	0.90**	0.93**	-0.58**	1.00	-0.47**	-0.18*
Green-up	-0.48**	-0.52**	0.52**	-0.47**	1.00	0.39**
Establishment	-1.01ns	-0.16ns	0.13ns	-0.18*	0.39**	1.00

*Significant at P, 0.05 with n = 150

**Significant at P, 0.01 with n = 150

ns = not significant with n = 150

† Data is based on the mean of the 2 growing seasons in 2007 and 2008

‡ Quality, color, texture, spring green-up and establishment were rated on a 1 to 9 scale with 9 equaling ideal turf, darkest green color, finest texture, entirely nondormant and green, and 100% filled in. Turf data were averaged across years from 2007 to 2008.

Seed Production Plots 1st harvest 2008



- Dry-land planted 18 May 2007
- Irrigated planted 17 Aug. 2007
- Experimental units were 1.8m x 2.1m (approximately 6 ft x 6.5 ft)



TARC Irrigated and Non-irrigated Plots



June 2008

- **10 selections x 5 parameters x 2 production environments x 3 replications = 300 experimental units**

Seed Production Evaluation

Harvesting began 23 June and completed 11 July 2008



Harvested material were hung and air dried for 2.5 wk



Total dry weight was recorded



Panicles were threshed with a Wintersteiger



Debearded with a hammer mill



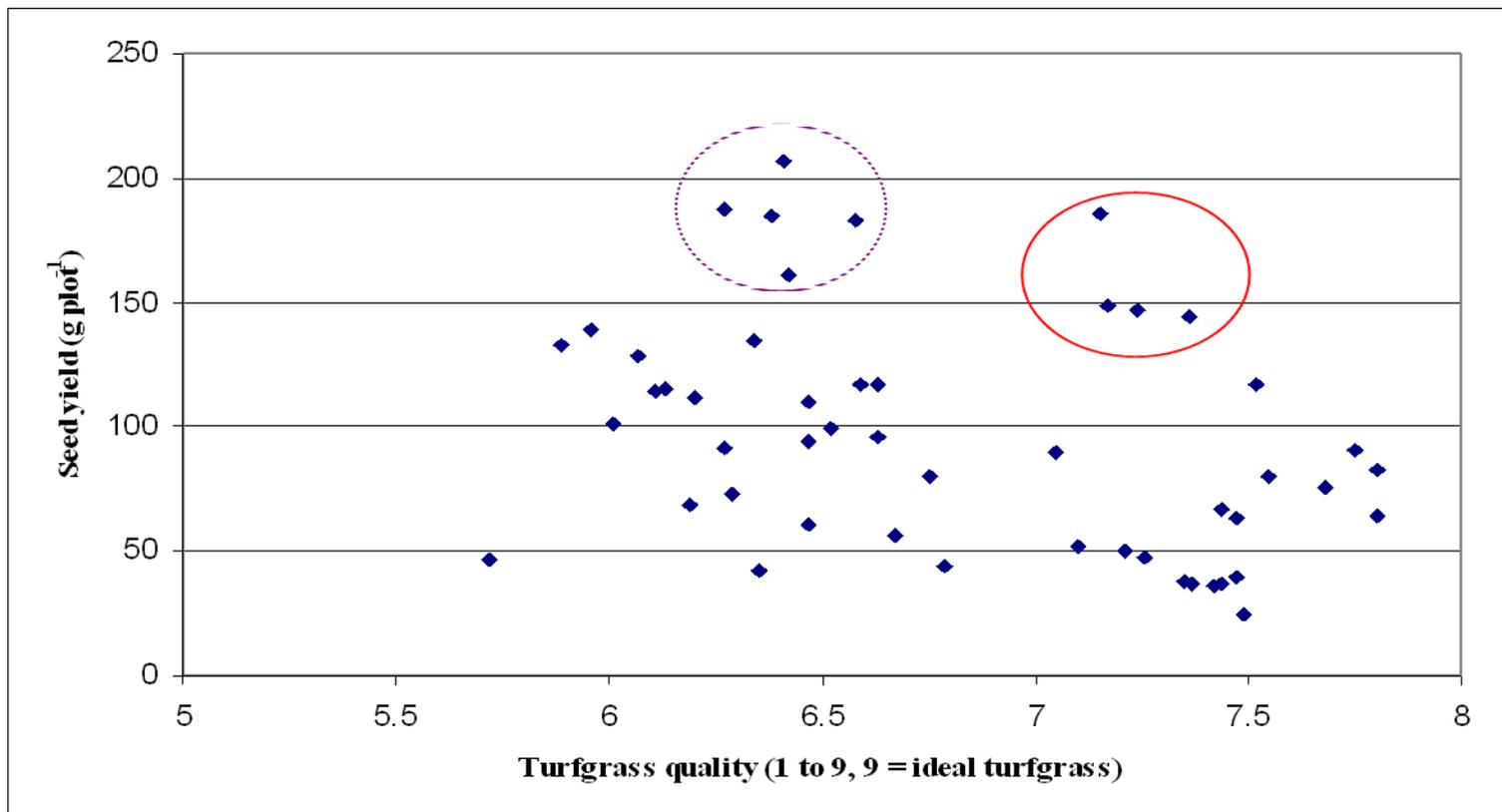
Cleaned with Clipper M2B air screen seed cleaners



Final Product



Kentucky bluegrass seed yield (2008) vs. turf quality (mean of 2007 and 2008) for entry x selection parameters at Pullman, WA



“The Winners”

Germplasm	Yield component	Seed yield (g)	Quality (1-9; 9 best)
Midnight	Base	64	7.8
371775	Heads per area	144	7.4
371775	Base	147	7.2
371775	Yield per plant	148	7.2
371775	Seeds per head	185	7.2
368241	Heads per area	161	6.6
Kenblue	Base	117	6.6
368241	Base	185	6.4
Kenblue	Seeds per head	207	6.4
368241	Seeds per head	183	6.3
368241	Yield per plant	188	5.7

PI 230132 A Future Prospect?

Turf



Seed Production



Future research: 2009 – 2011

- **Continue to harvest seed production plots**
- **Establish additional turfgrass plots:**
 - Seattle, WA**
 - Auburn, AL**
 - Other?**