

## Introduction

Kentucky bluegrass (*Poa pratensis* L.) is being developed for possible commercial release with transgenic traits. However, a better understanding of their potential environmental impact is needed, specifically if hybrids occur with other *Poa*.

## Objectives

Evaluate a reproductive, vegetative, and genetic fitness of hybrids between *Poa pratensis* and other *Poa* species.

## Methods

- Obtained eight hybrids of *Poa* species and a glyphosate resistant *P. pratensis* from a field gene flow study (Johnson *et al*, 2006)\* and greenhouse crosses.

- Six lines had five different genotypes, two lines had one genotype. Six ramets of each genotype were used.

- Four breeding chambers for each hybrid genotype to enable (Fig. 1):

- Backcross to maternal line
- Backcross to paternal transgenic line
- Intercross different hybrid genotypes within a line
- Selfing

- Three areas of plant fitness evaluated:

### - Reproductive Fitness

- Florets produced per plant
- Seed Weight per 100 seeds
- Percentage of viable pollen

### - Vegetative Fitness

- Plant circumference
- Number of tillers

### - Genetic Fitness

- Seed germination percentage
- Seedlings survival after herbicide screening
  - Seedlings were sprayed with 1% glyphosate to screen for the glyphosate resistance trait. Survivors were assumed to have inherited the resistance gene.



Figure 1. Breeding chambers used for pollen isolation.

Table 1. Surviving seedling percentage for the 2005 and 2006 breeding seasons.

2005 Hybrid Line	% Surviving	2006 Hybrid Line	% Surviving
<i>P. secunda</i> x <i>P. pratensis</i> var. 1	75.46%	<i>P. secunda</i> x <i>P. pratensis</i> var. 1	83.33%
<i>P. secunda</i> x <i>P. pratensis</i> var. 2	54.29%	<i>P. secunda</i> x <i>P. pratensis</i> var. 2	50.00%
<i>P. interior</i>	65.68%	<i>P. interior</i>	61.11%
<i>P. pratensis</i> var. 'Kenblue'	44.90%	<i>P. secunda</i> var. 'Sherman'	50.00%
<i>P. pratensis</i> (RUT-1)	89.42%	<i>P. pratensis</i> var. 'Kenblue'	95.56%
<i>P. pratensis</i> var. 'Coventry'	33.33%	<i>P. pratensis</i> (RUT-1)	86.25%
<i>P. pratensis</i> var. 'Touchdown'	39.54%	<i>P. pratensis</i> var. 'Touchdown'	70.98%
Transgenic <i>P. pratensis</i>	69.49%	Transgenic <i>P. pratensis</i>	77.25%
Control +	100.00%	Control +	100.00%

2005 Maternal Line	% Surviving	2006 Maternal Line	% Surviving
<i>P. secunda</i> x <i>P. pratensis</i> var. 1	2.50%	<i>P. pratensis</i> var. 'Kenblue'	3.87%
<i>P. pratensis</i> var. 'Kenblue'	26.67%	<i>P. pratensis</i> (RUT-1)	8.05%
<i>P. pratensis</i> (RUT-1)	50.00%	Transgenic <i>P. pratensis</i>	77.25%
Transgenic <i>P. pratensis</i>	69.49%	Control +	100.00%
Control +	100.00%		

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\*Johnson, P.G., S.R. Larson, A.L. Anderton, J.T. Patterson, D.J. Cattani, and E.K. Nelson. 2006. Pollen-mediated gene flow from Kentucky bluegrass under cultivated field conditions. *Crop Science* 46:1990-1997.

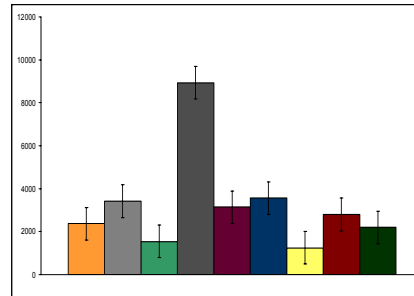


Figure 2. Florets per hybrid lines.

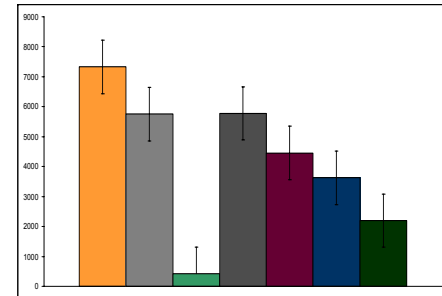


Figure 3. Florets per maternal lines.

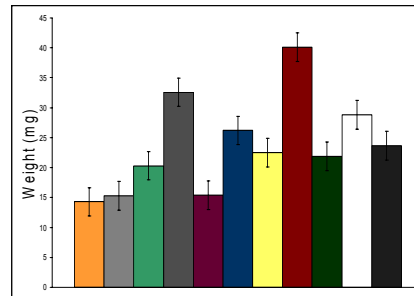


Figure 4. Seed weight of hybrid lines.

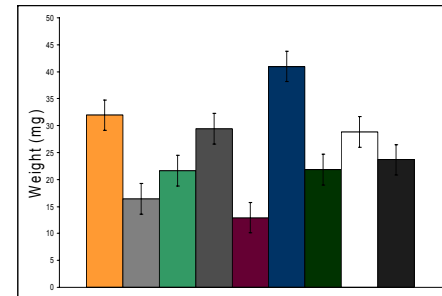
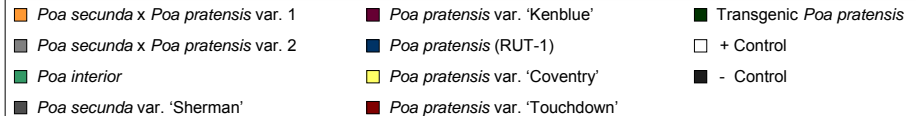


Figure 5. Seed weight of maternal lines.

## Graph Legend



## Results

- The paternal transgenic line was less fit than maternal lines overall. Therefore hybrids were compared only to the maternal lines.
- Overall the hybrids have similar or reduced reproductive, vegetative, and genetic fitness compared to their maternal line with the following exceptions:
  - *Poa interior*:
    - produced more florets per plant in 2006 (Fig. 2 & 3).
  - *Poa secunda* var. 'Sherman':
    - produced more florets per plant in 2006 (Fig. 2 & 3).
    - produced a higher seed weight in 2006 (Fig. 4 & 5).
- Not all the progeny of the hybrids or the transgenic paternal parent show the herbicide resistance trait (Table 1). One explanation is gene silencing. Another, more likely reason, is the progeny did not inherit the resistance trait, since both parents are likely heterozygous for the gene.
- Some progeny from the maternal lines in the backcross pairings survived glyphosate screening (Table 1). This is evidence that crossing did occur in these pairings, and all pairings of the experiment.