

Genetic Improvement of Prairie Junegrass

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Objectives:

1. Determine the genetic potential of native prairie junegrass (*Koeleria macrantha*) germplasm for use as low-input turfgrass.

Start Date: 2007

Project Duration: three years

Total Funding: \$30,000

Grass species that are native to North America should be better able to cope with our environment and could lead to overall reductions in inputs such as fertilizers, pesticides, and water. Prairie junegrass (*Koeleria macrantha*), which is native to the Great Plains of the United States, has shown the potential to be successfully used as a turfgrass in lower-input environments. The species is widely distributed throughout much of the western United States and it can also be found throughout much of Europe and Asia. Based on data that has been collected in recent years, this species appears to perform well in Minnesota under low-input conditions (no irrigation, limited nitrogen application, and no fungicide or insecticide applications).

Prairie junegrass has several attributes that make it a useful low-input turfgrass in Minnesota including tolerance of droughty and alkaline soils, tolerance of sandy areas, survival of low and high temperature extremes, and reduced growth rate. 'Barkoel' was the first cultivar of this species specifically developed for use as a turfgrass. However, this cultivar was developed with ecotypes from Europe.

We are proposing the development of a cultivar using germplasm native to North



Variation in seed production characteristics of three *Koeleria macrantha* accessions.

America.

Developing a high quality turfgrass is not, by itself, adequate. In order to be used by consumers, an economically viable turfgrass cultivar must be able to produce sufficient quantities of seed. Non-selected populations of the species can produce seed for 4-5 years. Collections of natural ecotypes made in 2005 suggest that individual genotypes may possess the ability to be highly productive. However, it is unknown if it can produce economically adequate amounts of seed.

In order for a cultivar of this species to be used on a wide scale, two criteria must be met: 1) the cultivar must pos-



Collecting prairie junegrass in southeastern Minnesota

sess adequate turfgrass quality in a medium to low maintenance management situation, and 2) the cultivar must possess adequate seed production traits so that a sufficient supply of seed can be produced at a reasonable cost.

We have collected native prairie junegrass germplasm from Minnesota, South Dakota, North Dakota, Colorado, and Nebraska. These germplasm collections have been established in breeding nurseries, and in some cases, experienced one cycle of selection. We have established several spaced-plant evaluations that will be used to determine the genetic variation present in our populations for various turfgrass and seed production characteristics.

In 2007, two experiments were established in both St. Paul and Becker, MN. The first experiment evaluated the



Poor mowing quality of a *Koeleria macrantha* genotype

USDA collection of *Koeleria macrantha* for seed production potential in Minnesota. The second experiment evaluated the same collections for turf potential as mowed spaced plants.

The seed production study is now complete and we found significant variation among accessions. Collections that showed high levels of seed production potential included germplasm collected in Iowa. Collections with low levels of seed production were generally from areas of southwestern Asia. Based on these results, we will place additional focus on the inclusion of local collections in our breeding program in order to improve seed production potential of the species.

Preliminary results from the mowing study indicate that sufficient variation for many important turf traits exists in the USDA collection. Of particular interest to our program are differences in mowing quality and the ability to maintain green color through summer stress periods. The mowing study will continue through 2009 and top-performing accessions will be integrated into our breeding program.

Summary Points

- Great diversity exists in public collections of *Koeleria macrantha*.
- Local collections will result in improved seed production characteristics.
- Integration of traits from diverse germplasm should be effective in the development of a low-input cultivar.