

Genetic Improvement of Prairie Junegrass



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Objectives:

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

Prairie junegrass (*Koeleria macrantha*), which is native to the Great Plains, 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 can also be found throughout much of Europe and Asia. The species has several attributes that would make it a useful low-input turfgrass including drought tolerance, survival of low and high temperature extremes, and reduced vertical growth rate.

Currently, there are a small number of cultivars that have been developed from germplasm collected in western and northern Europe; however, these cultivars are difficult to obtain and the seed quality is often not adequate. No turf cultivars developed from native North American germplasm are available. Our goal is to utilize native germplasm in a germplasm improvement program.

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 limited selection. We have evaluated this material in mowed spaced plants, turf plots, and seed production management trials (Fig. 1). We have also evaluated germplasm from other countries that

are available from the USDA National Plant Germplasm Resources Network (NPGS). These evaluations have indicated that a successful low-input prairie junegrass cultivar for golf course roughs and other landscapes is possible.

It has become clear that cultivars developed with European germplasm, most prominently 'Barkoel' and 'Barleria', have many of the traits necessary to produce

Figure 1. *Koeleria macrantha* germplasm in a seed production trial showing diversity in rust disease resistance. (photo credit: Donn Vellekson).



Figure 2. Turf plot evaluations of *Koeleria macrantha* in St. Paul, MN showing high turfgrass quality of European cultivars (right) and the medium quality of an unimproved collection from Eastern Europe (left). (photo credit: Andrew Hollman)



a project to make crosses between the European tetraploid populations and our native populations, which are diploid.

Our turf evaluations have also found a number of populations collected in Eastern Europe that do not display the excellent quality of Barkoel and Barleria, but have nevertheless withstood several years of extreme low-input management (no irrigation, no fertilizer, no pesticides, minimal mowing) (Fig. 2). These grasses are more moderate in quality, but they have traits that could be useful in the plant breeding program. These populations have been selected and will move forward in the breeding program.

Combining the higher turfgrass quality of the non-native collections with the superior seed production potential of the native germplasm should result in a cultivar that can be used effectively throughout the northern United States on low-input turf areas such as golf course roughs.

a slow growing, winter hardy, stress-tolerant turfgrass for use throughout the northern United States. These cultivars maintain attractive green color and slow vertical growth rate throughout summer stress periods without any inputs. The barriers that have kept these cultivars from establishing a market presence are primarily inconsistent seed production and issues with seed quality and germination. Fortunately, the native germplasm that we have been evaluating and advancing can contribute higher seed production potential and we have also seen improved seed quality and germination in our populations. We have initiated

Summary Points

- Non-native germplasm generally exhibits superior turfgrass quality but has lower seed production potential.
- Germplasm from Eastern Europe shows moderate turfgrass quality and could be useful in a germplasm improvement program.
- We will soon begin making crosses between native germplasm and cultivars from Europe.