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) 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 (Fig. 1), North Dakota, Colorado, and Nebraska. We have evaluated this material in mowed spaced–plant evaluations, turf plots, and seed production management trials (Fig. 2). 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.

During the past five years, we collected data on the performance of several native and non–native lines of prairie junegrass in a low–input turfgrass trial in St. Paul, MN. The trial was mowed as needed to maintain a three–inch height of cut (typically one time each month) and did not receive any fertilizer, pesticides, or supplemental irrigation after establishment. Most lines did very poorly, and many plots were invaded by common turfgrass weeds. Some lines, however,

Figure 1. Collection location in South Dakota. (photo credit: Matthew Clark)

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Figure 2. Prairie junegrass seed production management trial in Roseau, MN. (photo credit: Donn Vellekson)

Figure 3. Turf plot evaluations of prairie junegrass in St. Paul, MN showing high turfgrass quality of European cultivars. (photo credit: Andrew Hollman).

showed promise for use as low–input turf after the five–year period. Plants were taken from these plots and are now growing in a breeding nursery where we will select elite plants for harvest in summer 2014. We will then use harvested seed to establish another low–input turfgrass evaluation where we can continue to collect data on this germplasm.

It has become clear that cultivars developed with European germplasm, most prominently ´Barkoel´ and ´Barleria´, have many of the traits necessary to produce 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 (Fig. 3). 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 a project to make crosses between the European tetraploid populations and our native populations, which are diploid. 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.

Summary Points

- Non–native germplasm generally exhibits superior turfgrass quality but has lower seed production potential.
- Promising germplasm has been established in a breeding nursery that will be evaluated in 2014.
- We will soon begin making crosses between native germplasm and cultivars from Europe.

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