Collection and Evaluation of Native Grasses from Grazed Arid Environments for Turfgrass Development

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Objectives:

1. Collect and evaluate native grasses grazed rangelands for potential use as turfs in Arizona.
2. Determine species survival performance of mowed clones in the field.
3. Identify superior clones for future breeding.

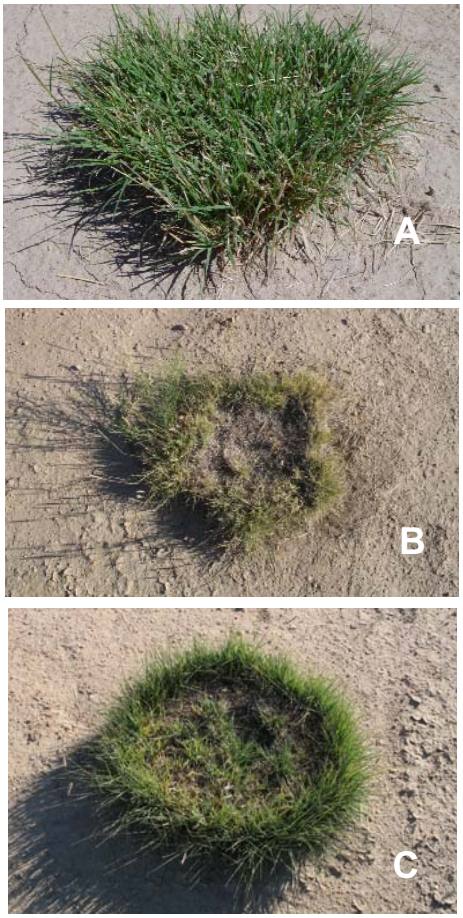
Start Date: 2008
Project Duration: 3 years
Total Funding: $29,993

The nationwide effort to use native grasses is spurred by concerns regarding species diversification and invasive habits of some commonly used turf species.

In 2008, clones of the bunchgrasses sprucetop grama, black grama, hairy grama, and wolfstail, which had the best color, density, and general turf quality in a greenhouse trial were propagated into multiple plant copies for field evaluation. One hundred clones from the 2007-2008 greenhouse tests were placed in a mowed spaced-plant nursery. Each of the clones appeared four times in the spaced-plant nursery, which numbered 400 plants in total. After transplanting into the field in July 2008, plants were mowed 3x weekly at 3.0 inches starting in August 2008, and from May through October in 2009 and 2010.

In the first year, wolfstail produced close spreading robust plants with high shoot densities, as did blue grama clones. Toward the end of the summer of 2009, the inner tillers began to die en masse in a concentric ring on wolfstail, and to a lesser extent on most blue grama plants, as well. Hairy grama plants developed coarse open stemmy plants and had poor density, regardless of plant size.

Sprucetop grama plots, however , did not die out with inner concentric rings, as did blue grama and wolfstail grasses. Instead, they produced bunch-type tillers from the center of the plant outward, with almost full viability of each separate tiller. Most plants of sprucetop grama maintained full green color leaves with a minimal amount of white leaves present. The shoot density was not as great as that of the wolfstails, before they fell apart, nor were the plants as large as the blue grama plants, but their appearance was clearly the best, and most plants were acceptable as a low maintenance turf.



Shown above are sprucetop grama (A), wolfstail (B), and blue grama (C). Sprucetop grama produced the best quality plants. Both blue grama and wolfstail did not persist under the desert heat of Tucson, .

All plants in the mowed spaced plant nursery were rated for turfgrass quality using a 1-5 scale (1 = straggly or dead plant, 5= excellent quality). On June 21, 2010, there are almost equal amounts of plants in each "quality" score class (1-5) for sprucetop grama. Several plants reside in the highest turfgrass quality score class (quality = 5). This means that after 2 years of mowing with minimal irrigation, 10%, or so, of the sprucetop grama plants selected as the better plants from the greenhouse study produced and maintained very good quality, and the phenotypic variation is distributed as a normal bell curve. This suggests that traits for improving turf-type habit are probably polygenic in nature, and plant improvement for the turf-type habit is possible through standard breeding techniques.

The vast majority of wolfstail plants had extremely poor turf quality. One hairy grama and two blue grama clones had good turf quality, but generally, blue grama plants did not hold-up in the heat of the long Tucson summer. They eventually produced an inner concentric ring of straw resulting from dead tillers within the center of the plant.

Although blue grama is used in many northern states as a low-maintenance turf, the total heat load in Tucson was overwhelming, and the clones selected from Arizona rangelands clones proved generally unacceptable under mowed conditions. Likewise, wolfstail on the range maintains good color and turgid leaves for several weeks of natural drought after a nominal rainfall, but when mowed consistently, the grass cannot survive adequately.

Sprucetop grama produced the best (and acceptable) quality plants. The next logical step is to screen a larger sample of this species, and cross the best with the best. Seed from such crosses will go into mowed turf plots.

Summary Points

- We collected 300 clones from seven species of perennial range grasses were collected from a 150-mile radius of Tucson. One hundred bunchgrass and 100 stoloniferous grasses were selected for field evaluation under regular mowing.
- The vast majority of wolfstail plants had extremely poor turf quality.
- The blue grama and wolfstail clones selected from Arizona rangelands clones proved generally unacceptable under mowed conditions.