2003-36-278

Title: Buffalograss breeding and genetics

Project leader: Keenan Amundsen

Affiliation: University of Nebraska-Lincoln

Objectives: The primary objective of this study is to develop, through selection and plant breeding, buffalograss suitable for golf course fairways, tees, and roughs.

Start date: 2017

Project duration: Continuous

Total funding: $30,000

Summary:

The turfgrass sciences program at the University of Nebraska-Lincoln (UNL) is developing buffalograss [*Buchloë dactyloides* (Nutt.) Engelm. syn. *Bouteloua dactyloides* (Nutt.) Columbus] suitable for use on golf courses. Buffalograss has exceptional heat, drought, and low temperature tolerance and is a model low-input warm-season turfgrass species. The UNL buffalograss breeding program sponsored a plant collection trip led by graduate student Collin Marshall to collect buffalograss from the southern and western areas of the primary buffalograss growing region (Figure 1). The collection trip yielded 140 new entries that may serve as new sources of pest resistance, abiotic stress tolerance, or turfgrass performance traits. The collection is currently being propagated in anticipation of the 2018 growing season, when turf performance and plant morphology will be documented for the field-grown plants. Under greenhouse management, morphological differences among the collection are already apparent including leaf texture, genetic color, canopy density, canopy architecture, gender expression, stolon proliferation, and stolon internode length (Figure 2). In addition, a commercial DNA extraction kit is being used to extract total genomic DNA from each entry. From existing high throughput sequence data, genetic markers suitable for variety discrimination will be developed and tested on the new collection, elite material from the breeding program, and named cultivars.

Pest resistance and turfgrass quality have been the priority of the buffalograss breeding efforts at UNL, further capitalizing on the innate drought, heat and cold tolerance of the species. We are in an annual cycle of establishing crossing blocks, evaluating progeny, identifying top performing populations, seed increases, and advanced line evaluations. Our newest advanced evaluation trial is managed at 5/8” mowing height and most accessions are performing as good as or better than the standard entries. Several accessions retain green color and canopy density late into the fall (Figure 3). Late season color and canopy density following summer are important attributes that impact the market appeal of buffalograss and for all turfgrasses used on golf courses.

In addition to our breeding efforts, we are continually refining buffalograss establishment and management practices. As an example, buffalograss is slow to germinate. We are working to develop turf type blue grama that could be used in a mixture with buffalograss because it is aesthetically

compatible with buffalograss and because it germinates significantly faster. Similarly we have tested mixing buffalograss with other grasses to reduce plot establishment time. During the 2017 growing season, we experimented with the use of annual ryegrass, which we chose because it should naturally thin out over time allowing the buffalograss to fill in without the need for herbicides. At the end of the growing season we found that the annual ryegrass plots had poor quality (Figure 4). Our annual ryegrass seeding rates (1# or 3# per 1,000 sq. ft.) were likely too high, resulting in poor buffalograss establishment in the first year. More research is needed to optimize seeding rates, for this to be a viable establishment method for turfgrass managers. We are applying both development and management strategies develop improved buffalograss cultivars and also optimizing management practices to make managing those new (or existing) cultivars easier.

Summary points:

1. UNL buffalograss germplasm collection was expanded with 140 new entries
2. Elite buffalograss breeding lines have exceptional turfgrass performance
3. Blue grama compared to annual ryegrass mixtures with buffalograss are preferred to achieve a diverse and uniform turf

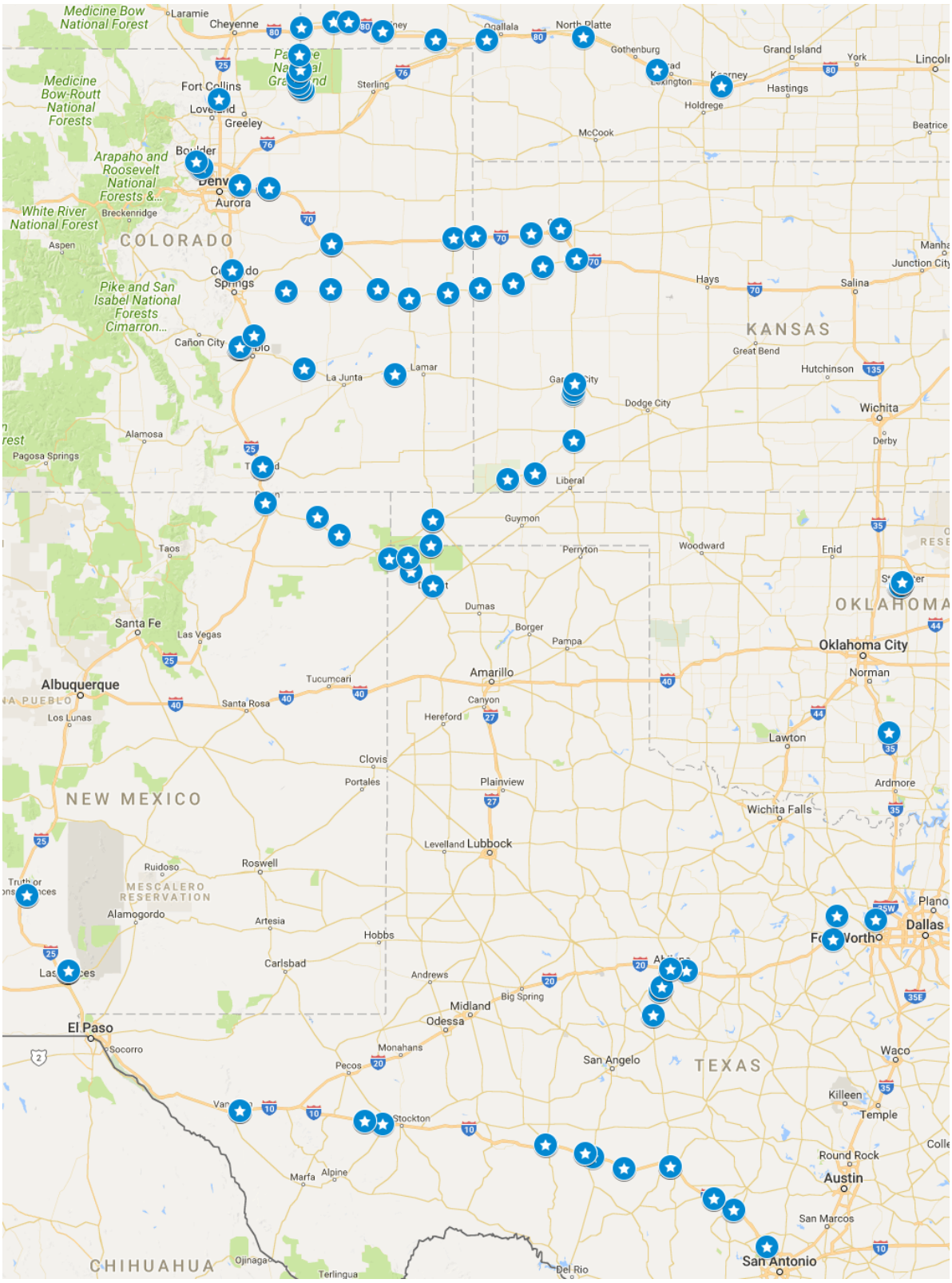

Figure 1. Google map indicating the location of GPS tagged sites of buffalograss collected during the summer of 2017.

Figure 2. Buffalograss accessions being propagated in the University of Nebraska-Lincoln greenhouse facilities. The accessions were collected from the southern and western areas of the primary buffalograss growing region during the summer of 2017.

Figure 3. Late fall color retention of elite buffalograss breeding material. Photo taken on October 18th, 2017.

Figure 4. Evaluation study to test the use of annual ryegrass as a mixture with buffalograss. Monostands of buffalograss germinated slower, but had better turf quality at the end of the growing season (upper outlined plot) compared to plots containing a mixture with annual ryegrass (lower outlined plot).