Breeding and Evaluation of Turf Bermudagrass Varieties

Yanqi Wu, Dennis L. Martin, and Charles M. Taliaferro
Oklahoma State University

Objectives:

1. Assemble, evaluate, and maintain *Cynodon* germplasm with potential for contributing to the breeding of improved turf cultivars.
2. Develop and use simple sequence repeat molecular markers.
3. Improve bermudagrass germplasm for seed production potential, cold tolerance, leaf-firing resistance, and other traits that influence turf performance.
4. Develop, evaluate, and release seeded and vegetatively propagated turf bermudagrass varieties.

Start Date: 2010 (current cycle)
Project Duration: 3 years
Total Funding: $90,000

A large C. dactylon x C. transvaalensis *putative F1 progeny population was evaluated in 2010 for selection of superior vegetatively propagated plants at Oklahoma State University.*

Breeding programs in bermudagrass [*Cynodon dactylon* (L.) Pers., *C. transvaalensis* Burtt-Davy, and their hybrids *C. dactylon* x *C. transvaalensis*] continue to provide genetically improved cultivars for the turf industry in the southern U.S. and throughout tropical and warmer temperate regions of the world. The OSU turf bermudagrass genetic improvement program made progress in the development and evaluation of experimental cultivars, development and utilization of simple sequence repeat (SSR) markers for bermudagrass, and release of two superior clonal turf bermudagrass genotypes as new cultivars in 2010.

OKC 1119 was released as a new cultivar by Oklahoma Agricultural Experiment Station in July 2010, but an official name has not been selected yet. OKC 1119 is a clonally propagated F_1 hybrid from a cross of *C. dactylon* x *C. transvaalensis*. The genotype has been evaluated in several OSU experiments, and more comprehensively and extensively in the National Turfgrass Evaluation Program (NTEP) 2007 National Bermudagrass Test (http://www.ntep.org/bg.htm).

The major strengths of OKC 1119 are its exceptional turf quality, fine texture, improved winter hardiness, high sod density, and very good sod tensile strength. The combined performance data indicate it has less risk of winter injury than 'Tifway', while providing higher or equal turf quality. Compared to 'Midlawn', its turf quality is much improved. OKC 1119 is also better than 'Midlawn' in sod tensile strength, a major consideration for sod growers.

OKC 1134 was released as a new clonal bermudagrass turf cultivar by OAES at the same time as OKC 1119. OKC 1134 is a clonally propagated interspecific F_1 hybrid that exhibited superior performance in 2007 NTEP National Turf Bermudagrass Test (http://www.ntep.org/bg.htm). The major strengths of OKC 1134 are its high turf quality, fine texture, improved winter hardiness, early green-up, high sod density, and very high sod tensile strength. The combined performance data indicate it has less risk of winter injury than 'Tifway', while providing equal turf quality. Compared to 'Midlawn', its turf quality is much improved. OKC 1134 is much better than 'Midlawn' in sod tensile strength, a major consideration for sod growers. An official name for OKC 1134 is to be selected.

Screening of more than 1,500 putative F_1 progeny plants (*C. dactylon* x *C. transvaalensis*) was performed in 2010 by selecting 10 superior progeny plants after evaluating winter color retention, spring green-up, winterkill, foliage color, texture, sod density, seedhead abundance, and overall turf quality for 3 years.

We developed SSR markers in bermudagrass by transferring sorghum genomic SSR primers and by exploring bermudagrass expressed sequence tags (ESTs) from the National Center for Biotechnology Information database. Transferability of 354 tested sorghum SSRs was 57% to *C. transvaalensis* 'T577', 27% to *C. dactylon* 'Tifton 10',and 22% to 'Zebra'. From 20,237 *Cynodon* ESTs at NCBI, 303 designed SSR primer pairs amplified target bands in at least one of *C. dactylon* var. *aridus*, *C. transvaalensis* 'T577', *C. dactylon* cv. 'Tifton 10', and *C. dactylon* var. *dactylon* 'Zebra'.

Eleven SSR markers were selected on the basis of their polymorphisms to amplify respective DNA samples of 32 commercial and experimental clonal turf bermudagrass cultivars. The study revealed one highly polymorphic marker, and any one of the remaining 10 markers are able to identify all non-mutation cultivars.

Summary Points

- OKC 1119 and OKC 1134 were released as new clonal turf bermudagrass cultivars by OAES in 2010.
- A set of 10 superior clonal bermudagrass putative hybrids were selected in 2010 from a screening nursery for next-step in-house comprehensive evaluation.
- A large set of SSR markers were developed from bermudagrass EST sequences and pre-existing sorghum SSR markers.
- Eleven polymorphic SSR markers were selected to amplify 32 clonal turf bermudagrass cultivars.