Development of New Bermudagrass Varieties with Improved Turf Quality and Increased Stress Resistance

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Objectives:

1. Improve bermudagrass germplasm for seed production potential, turf performance traits, and stress resistance.
2. Develop, evaluate and release seed- and vegetatively-propagated turf bermudagrass varieties for use on fairways, tee boxes and putting greens.
3. Assemble, evaluate and maintain *Cynodon* germplasm with potential for contributing to the genetic improvement of the species for turf.

Start Date: 2016
Project Duration: six years
Total Funding: $300,000

Bermudagrass is the most widely used turfgrass in the southern USA and throughout tropical and warmer temperate regions of the world. The long-term goal of the Oklahoma State University (OSU) turf bermudagrass breeding program is to develop seeded and clonally propagated cultivars with high turf quality and improved resistance to abiotic and biotic stresses. Turf bermudagrass breeding and evaluation research activities performed by the OSU team in 2016 are summarized as follows.

A nursery of 98 cold hardy plants was evaluated for turf performance, seed yield and related traits as part of Ph.D. graduate student Yuanwen Guo's thesis project. Results of this experiment indicated that large genetic variability existed for 12 of 13 tested adaptive, morphological and reproductive traits within this cold hardy germplasm. Spring greenup was found to be highly and positively correlated with turf density and fall color retention. Leaf spot disease had negative correlations with greenup and inflorescence prolificacy. Percent seed set was negatively associated with raceme length. Broad-sense heritability estimates were 0.03-0.25 for first internode length and fourth leaf blade width, 0.36 for first internode diameter, 0.64 for fourth leaf blade length, and 0.72-0.80 for inflorescence prolificacy, raceme length and percent seed set. The large genetic variability within the cold hardy germplasm has potential value in selecting superior parental plants with desirable traits for producing interspecific hybrids and forming synthetic cultivars, in addition to developing new breeding populations.

Spring Dead Spot (SDS) disease is a major biotic threat to turf bermudagrass in the transition zone. Thirty-five official and four local entries in the 2013 NTEP bermudagrass trial established at the OSU Turf Research Center (TRC) are under study to test SDS disease resistance. Experimental entries developed in the OSU program, OKC 1131, OKC 1163, OKC 1302, OKS 2009-3, OKS 2011-1, and OKS 2011-4 are included in the NTEP trial. Each plot of the replicated experiment was inoculated on two sites with a blend of *Ophiosphaerella herpotricha* fungal pathogen on November 11, 2016 (Figure 1). We anticipate SDS symptoms in the nursery will appear in two or three years and continue for an additional two to four years.

Developing greens-type bermudagrass cultivars is an important component of the current project funded by the US Golf Association. Sixteen experimental selections and four commercial cultivars (Champion Dwarf, Mini Verde, Sunday, and Tifdwarf) were tested for putting green turf performance in a replicated field trial established at the OSU TRC in 2015 (Figure 2). The OSU experimental entries were selected from more than 11,000 clonal plants derived from new interspecific crosses between selected *Cynodon dactylon* and *C. transvaalensis* parents. The trial will continue in 2017 and 2018.

Summary Points

- A common bermudagrass experiment indicated large variability for seed yield, morphology and adaptation related traits within 98 cold hardy plants.
- The 2013 NTEP bermudagrass trial entries plus local standards are being evaluated for resistance to Spring Dead Spot caused by *Ophiosphaerella herpotricha* at Stillwater, OK.
- Sixteen fine-textured bermudagrass selections and four greens-type commercial cultivars were tested in a replicated field trial for turf performance under greens management conditions.

Figure Captions

Figure 1. The 2013 NTEP bermudagrass trial at Stillwater, OK was inoculated with the fungal pathogen *Ophiosphaerella herpotricha* to test for Spring Dead Spot disease resistance.

Figure 2. A mowing trial of 16 fine textured clonal bermudagrass selections and four commercial cultivars was established to test turf quality under putting green management conditions at the OSU Turf Research Center, Stillwater, OK.