

**Progress Report:** November 29, 2015

**Project Title:** Evaluation of Putting Green Bermudagrass for Shade Tolerance and Evaluation of Fairway Bermudagrasses for Water Use Rates

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**Project #1:** Evaluation of Putting Green Bermudagrass for Shade Tolerance

**Objectives:**

- *Evaluate experimental and commercialized putting green bermudagrasses against Diamond zoysiagrass under full sun and shaded conditions.*

**Research Progress:**

- Plots were planted from sprigs on a sand based putting green in July 2013 and fully established in 2014.

**Preliminary Results:**

- TifEagle, 264, MiniVerde, and Champion performed best in 2014 while Diamond, MiniVerde, TifEagle, and Champion were the best cultivars in 2015.
- 16-13-8 and 1-75-2 were consistently ranked lowest in 2014 and 2015.
- Diamond Zoysiagrass exceptionally performed well in 2015 compared to all bermudagrass cultivars.

A research site was planted using greenhouse-grown grass sprigs on June 7, 2013. A row of fully mature *Platanus occidentalis* runs parallel to the east side of the study area and provides natural, tree shade in the morning and early afternoon, depending on season. The site was blocked to provide six replications of each cultivar. Photosynthetically active radiation was collected throughout the study period. The plots were covered with a geo-textile to protect against low temperature injury.

The standard entries, 'Champion', 'Mini Verde', 'TifEagle' Bermudagrass, and 'Diamond' zoysiagrass and experimental entries, were planted on 5 x 5 ft. plots. Plots were

mowed 6 times per week at a 0.155 height and nitrogen was applied at 49 kg/ha monthly. Irrigation was applied at rates and frequencies necessary to maintain acceptable green turf. Trinexapac-ethyl was applied as a standard treatment to all plots during the growing season.

Turfgrass visual quality was assessed monthly based on 1-9 scale. In addition, Normalized difference vegetative index (NDVI) was collected monthly using a GreenSeeker NDVI hand-held sensor to assess shade stress through changes in turfgrass color and cover.

In 2014, TifEagle had higher turf quality than other entries with the exceptions of MS264 and MiniVerde (Table 1). The standard entries had higher turf quality and NDVI compared to all OSU experimental entries in 2014. The OSU entries and Diamond zoysiagrass showed unacceptable turf quality in 2014. In 2015, all bermudagrass entries had lower turf quality compared to Diamond zoysiagrass. In both years, OSU1-75-2 was the lowest performer in terms of turf quality and NDVI.

Table 1. The whole season turf visual quality and normalized difference vegetation index (NDVI) response of bermudagrass entries maintained as a putting green in the shade in Stillwater, OK in 2014 and 2015.

2014			2015		
Cultivar	TQ	NDVI	Cultivar	TQ	NDVI
TifEagle	6.6a*	0.739a	Diamond	6.0a	0.663a
MS264	6.1ab	0.708a	Miniverde	5.5b	0.649a
MiniVerde	6.1ab	0.737a	TifEagle	5.4bc	0.657a
Champion	6.0b	0.743a	Champion	5.0cd	0.636a
OSU13-78-5	4.8c	0.656b	MS264	5.0cd	0.644a
Diamond	4.8c	0.596cd	OSU13-78-5	4.8d	0.635a
OSU16-13-8	4.3cd	0.617bc	OSU16-13-8	3.9e	0.582b
OSU1-75-2	3.9d	0.563d	OSU1-75-2	3.4f	0.538c

\* Treatments within column with same letters are not significantly different at  $p=0.05$ .

## Project #2: Evaluation of Fairway Bermudagrasses for Water Use Rates

**Objectives:** Evaluate, measure, and explain any differences in water use rates among several industry standard bermudagrass cultivars vs OSU experimental bermudagrasses.

### Research Progress:

- Lysimeters were maintained in the greenhouse from December to April each year to prevent winter injury.

### Preliminary Results:

- ET rates in 2014 ranged from 4.93 mm d<sup>-1</sup> to 6.19 mm d<sup>-1</sup> and ranged from 3.88 mm d<sup>-1</sup> to 6.03 mm d<sup>-1</sup> in 2015.

- DT-1 was a higher water using entry in 2014 and 2015 with ET of 6.19 mm d<sup>-1</sup> and 6.03 mm d<sup>-1</sup>, respectively, but was not different than standard entries Celebration or Tifway.
- OKC 1131 and OKC 1163 were lower water using entries in both 2014 and 2015.

The research site was a former 2002-2006 NTEP (National Turfgrass Evaluation Program) bermudagrass trial with 2.4 x 2.4 m plots. Six genotypes out of ten were new which were not included in the original NTEP trial. These were 'Latitude 36', 'NorthBridge', DT-1, OKC 1302, OKC 1131, and OKC 1163.

The lysimeters were constructed using polyvinyl chloride (PVC) tube, 15.2 cm inside diameter and 35.6 cm long with a root zone depth of 30.48 cm and an extra 5.1 cm of length below the root zone to accommodate a drain valve on the bottom (Photo 1). A threaded ball valve was installed onto the bottom inside of each lysimeter. The inner side of the lysimeter was filled with a geo-textile porous sheet to prevent any loss of the rooting medium. The rooting medium is a calcined clay product.

Field ET rate was collected from May to September in 2014 and August to September in 2015 (Photo 3).

NorthBridge, OKC 1131, and OKC 1163 were the lower water use entries in both 2014 and 2015 whereas Celebration, Tifway, DT-1 were higher water use entries (Table 2).

Table 2. Mean daily evapotranspiration (ET) rates (mm d<sup>-1</sup>) of ten bermudagrass entries under non-limiting soil moisture conditions in 2014 and 2015.

2014		2015	
Entries	ET*	Entries	ET
DT-1	6.19a**	DT-1	6.03a
Celebration	6.08ab	Tifway	5.36ab
OKC 1302	6.07ab	Celebration	5.19ab
Tifway	6.00b	Premier	5.15ab
Premier	5.71c	Latitude36	5.10b
Latitude 36	5.70c	TGS_U3	4.99bc
TGS_U3	5.51d	OKC1302	4.59bcd
OKC 1131	5.18e	NorthBridge	4.19cd
NorthBridge	5.17e	OKC1163	4.01d
OKC 1163	4.93f	OKC1131	3.88e

\* Water use in mm d<sup>-1</sup>. Values are the mean of 14 ET rates and 6 ET rates in 2014 and 2015, respectively.

\*\* Treatments within column with same letters are not significantly different at  $p=0.05$ .

Photo 1. A row of fully mature *Platanus occidentalis* on the east side of the study area.



Photo 2. A lysimeter in a field plot.



Photo 3. ET rate collection from field plots.

