

Selection of Bermudagrass Germplasm that Exhibits Potential Shade Tolerance and Identification of Techniques for Rapid Selection of Potential Shade-Tolerant Cultivars

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Objectives:

1. Cross bermudagrass selections screened for shade tolerance and fine turf qualities over the past three years.
2. Establish progeny from seed and evaluate the progeny for shade tolerance, seed yield, and fine turf qualities.
3. Develop shade-tolerant seeded bermudagrass cultivar(s).
4. Study techniques with potential for rapid selection of shade resistant bermudagrasses

Start Date: 2011

Project Duration: 3 years

Total Funding: \$60,000

Bermudagrass has good drought, heat, and salt tolerance and is resistant to many pests but does not tolerate shade nearly as well as most grasses. The development of a shade-resistant bermudagrass, especially a seed propagated type, suitable for both golf course fairways and rough would make a substantial contribution to the turf-grass industry.

A research site was planted using greenhouse-grown bermudagrass plugs on June 22, 2007 at the OSU Turfgrass Research Center, Stillwater, OK. The research site receives mid- to late-afternoon shade, depending on season, from a dense, mature evergreen canopy on the west side of the site. In 2010 we increased the length of the shade period to 89% of each day by adding 75% black woven shade cloth above the research block. Shade cloth was added over the identical block previously used as a full sun block in 2011 to provide moderate shade and a third block established in June 2009 became the full-sun block.

Through the growing seasons in 2008, 2009, 2010, and 2011, the study consisted of 45 bermudagrass selections and four vegetatively propagated standards: 'Celebration', 'Patriot', 'TifGrand', and 'Tifton10'. Each bermudagrass was replicated five times. Visual turf quality (TQ) and Normalized Difference Vegetative Index (NDVI) were assessed every two weeks in 2008 through 2011. Photosynthesis was measured in the 5 best performing selections (2008 and 2009 data), 5 worst selections and 4 standards in spring, summer and fall 2010 and 2011 with a LI-6400 (LiCor, Lincoln, NE) portable gas exchange system. Internode



The research block in the foreground was established in 2009 and was used as the full sun block in 2011. The original full sun block (background) was covered with a strip of shade cloth and considered moderate shade. The deep shade plot is not displayed but is just to the left of the moderate shade block.

length and density were measured monthly in 2010 and 2011.

Photosynthesis data obtained in 2010 and 2011 did not suggest a relationship between the rate of photosynthesis in shade or in sun with bermudagrass performance.

Longer internode in shade was a consistent occurrence in the best performing selections but was not a consistent occurrence in the poorest performing selections. For that reason, internode length may have some promise for rapid selection of shade-tolerant species.

The most dense bermudagrass selections in sun were not necessarily the most dense in shade limiting density as a factor for determining grasses in full sun that may have potential for strong performance in shade.

A single cross of two best performing selections was attempted in 2009-10 but was unsuccessful due to poorly matched physical characteristics. In 2011,

selected clonal plants, 013, 023, 024, 028, 034, 035, 079, 116, and 118 were used in polycrosses. One single cross between 118 (shade tolerant) and 083 (shade sensitive) was field established. Seed from the polycrosses may be available for planting and testing as early as July, 2012.

Summary Points

- In 2011, selections were made from the shade study and planted for polycrossing and potential seed harvest in 2012.
- Photosynthesis was greater in summer than in spring and fall but did not correlate well with bermudagrass shade performance.
- Selections that performed well in shade had longer internodes in shade than in full sun; poor performing selections did not necessarily exhibit this trait.
- Bermudagrass density in full sun was not consistently related with its density in shade.