Zoysiagrass Performance in Arkansas as Influenced by Nitrogen Rate, Mowing Height, and Cultivar

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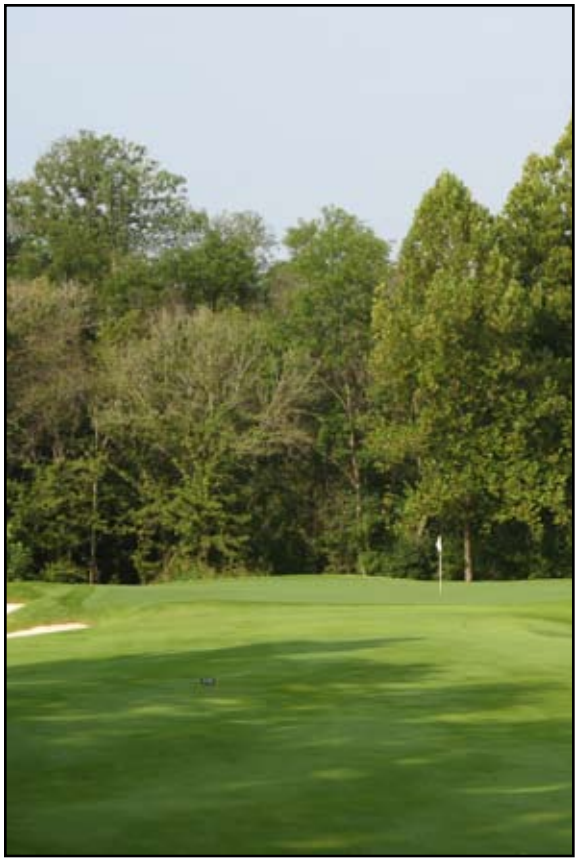

Photo by Aaron Patton

Nitrogen rate and mowing height influences zoysiagrass quality.

Summary. Zoysiagrass is a commonly used turf species in lawns and golf courses in Arkansas, but little information is available regarding the management of these cultivars on golf courses or lawns in Arkansas. The objective of this study was to characterize a general response (color, density, turf quality, and disease incidence) to nitrogen fertilization, mowing, and their interactions among zoysiagrass cultivars. Turf density was improved when fertilizing ≥2 lbs N/1000 ft^2/year. Spring green-up was highest for 0.5-inch mown plots. Among 1.5-inch mown plots, higher nitrogen rates (≥4 lbs N/1000 ft^2/year) decreased spring green-up. Scalping was greatest when mowing at 0.5-inch and fertilizing with 6 lbs N/1000 ft^2/year. There was no advantage to fertilizing more than 2 lbs N/1000 ft^2/year. Turf quality was never unacceptable for the unfertilized check plots.

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Zoysiagrass (*Z. japonica* or *Z. matrella*) is increasing in popularity and availability with over 30 cultivars now commercially available. Zoysiagrass has historically been more widely used on golf courses in the upper transition zone. However, due to better performance of newer cultivars, there has been a recent trend to plant zoysiagrass on golf courses in the lower transition zone and further south. While use has increased, zoysiagrass is typically considered an alternative to bermudagrass for many golf courses in the southern U.S. Therefore, knowledge regarding the management of these new cultivars is critical as they are marketed and recommended for use.

Previous research in Texas found that turfgrass quality during summer was improved with higher nitrogen (N) rates, especially at a lower mowing height, but there were no discernable effects of N and mowing height on winter and spring turf quality (Engelke et al., 1992). Additional research has focused on mowing heights or fertility, but not a combination of the two. In South Carolina, *Z. matrella* had excessive thatch and scalping at high N rates (>3 lb N/1000 ft^2), but thatch was not problematic in *Z. japonica* (Hale, 2006). Others concluded that 2 lb N/1000 ft^2 or less during the growing season was sufficient to maintain turf quality in Missouri (Dunn et al., 1995). However, more information is needed for recommending N rates for *Zoysia* spp. in Arkansas. The objective of this study was to characterize a general response (color, density, turf quality, and disease incidence) to nitrogen fertilization, mowing, and their interactions among zoysiagrass cultivars.

Materials and Methods

Experimental areas were sprigged in 2001 at the Arkansas Agricultural Research and Extension Center, Fayetteville, Ark. with El Toro, Meyer, and Cavalier zoysiagrass. Plots were maintained from 2002 to 2007 using 1 to 2 lb N/1000 ft^2/year on a Captina silt loam with pH of 6.2. Fertilization treatments were initiated in May 2008 using sulfur-coated urea applied at 0, 2, 4, and 6 lb N/1000 ft^2/year applied on May 1, June 1, July 1, August 1, and September 1. No supplemental phosphorus (P) or potassium (K) was applied in either 2008 or 2009 since soil test levels in both years indicated sufficient quantities of those nutrients. Plots were split by block and mown at either 0.5 or 1.5 inch as needed to allow for evaluation at a range of mowing heights. Responses of varying cultivars to fertility programs, and mowing heights were evaluated in 2008 and 2009 as turf quality, density, green-up, scalping, and disease. Turf quality was visually assessed on a 1 to 9 scale, with 9 representing ideal dark green, uniform, fine-textured turf and 1 representing dead turf. Cultivars were visually evaluated for spring green-up using a scale of 1 to 9, with 9 representing complete green color and 1 representing a completely dormant turf stand. Density was rated on a scale of 1 to 9, with 9 representing maximum density. Scalping and disease were evaluated as visual estimates.

Results and Discussion

Results after two years of this study indicate that turf density is improved through cultivar selection and N fertility (data not shown). Cavalier consistently had greater turf density than Meyer and El Toro. Increasing annual nitrogen applications ≥2 lb N/1000 ft^2 also improved turf density. In the spring of 2009 (after one year of fertility treatments), N rates ≥4 lb N/1000 ft^2/year resulted in a delay in spring green-up and a decline in turf quality at the 1.5 inch mowing height (Fig. 1). This lack of spring green-up and a reduction in turf quality in spring of 2009 did not appear to be damage from winter kill. Instead it appeared to be a delayed green-up possibly due to the fact that the higher nitrogen rates the previous fall produced a denser canopy that shaded emerging shoots in the spring of 2009 causing an apparent decrease in green cover and a decrease in turf quality.

Turf quality was highest in the summer for plots receiving ≥2 lb N/1000 ft^2/year at a 1.5 inch mowing height (Fig. 2), but turf quality was never unacceptable (<6) for the unfertilized check plots in either year. Turf quality was only improved at rates >2 lb N/1000 ft^2/year in the fall due to an improvement in fall color (Fig. 3). There was little scalping in our study; but on one collection date, mowing at 0.5 inch and fertilizing with 6 lb N/1000 ft^2/year resulted in increased scalp-

ing (data not shown). Turf quality was generally highest for Meyer and Cavalier across a range of evaluation dates, although all cultivars produced acceptable turf quality (Fig. 4).

These results are in agreement with previous results that zoysiagrass requires little N fertility to produce an acceptable quality turf. One exception might be when growing zoysiagrass on sandy soils with a longer growing season, such as in Florida. In Arkansas, a 2007 informal survey indicated that some golf course superintendents were using upwards of 3.5 lb N/1000 ft^2/year to maintain zoysiagrass fairways. Results for this study indicate that there is no advantage to using more than 2 lb N/1000 ft^2/year. Hopefully, these results, along with similar research in other states will provide necessary information to help fine-tune zoysiagrass management programs and reduce N inputs. This study will continue through 2010. Thatch accumulation and large patch severity will be evaluated in the future.

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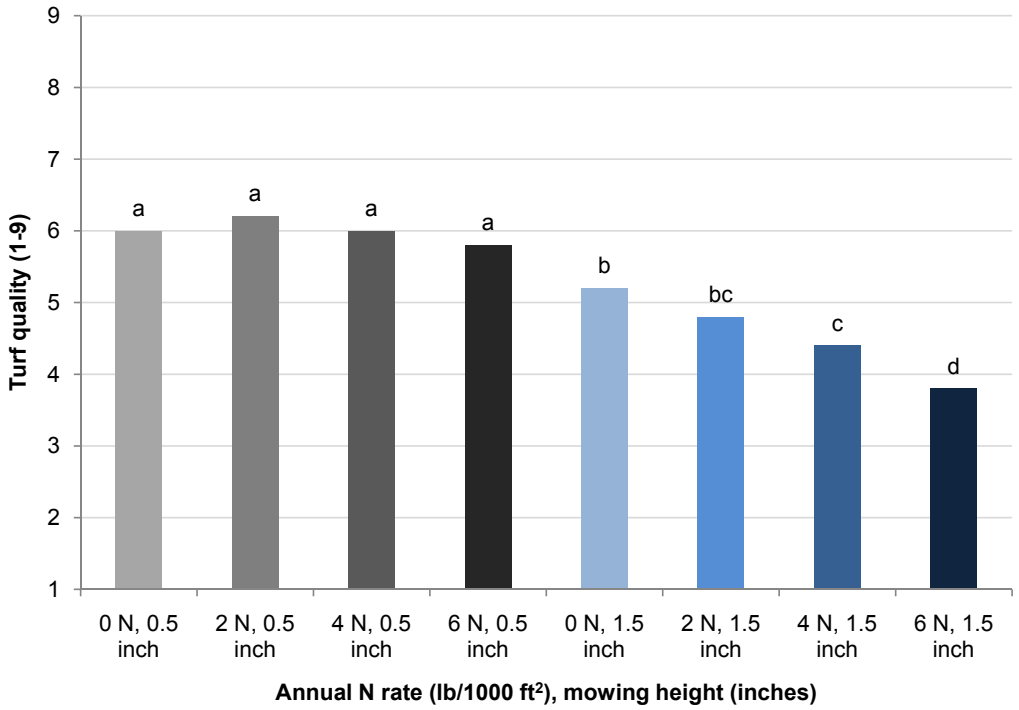

Fig. 1. Influence of mowing height and nitrogen fertility on zoysiagrass turf quality across three zoysiagrass cultivars on 15 May 2009. Means followed by the same letter are not significantly different according to Fisher's protected LSD, α = 0.05.

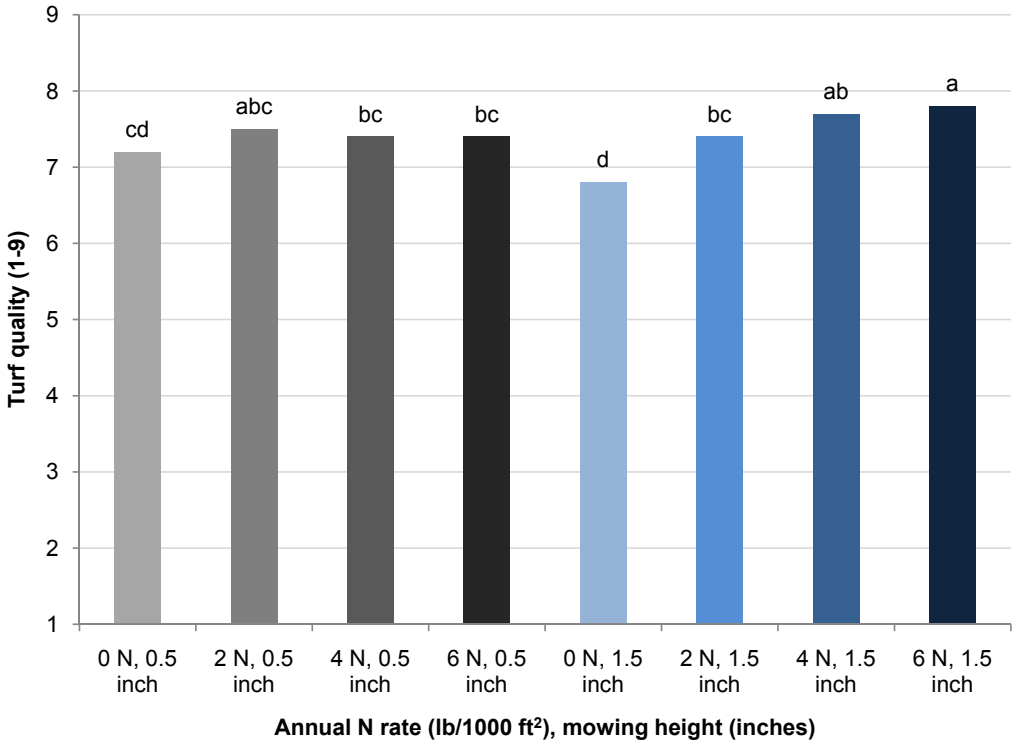

Fig. 2. Influence of mowing height and nitrogen fertility on zoysiagrass turf quality across three zoysiagrass cultivars on 26 August 2009. Means followed by the same letter are not significantly different according to Fisher's protected LSD, α = 0.05.

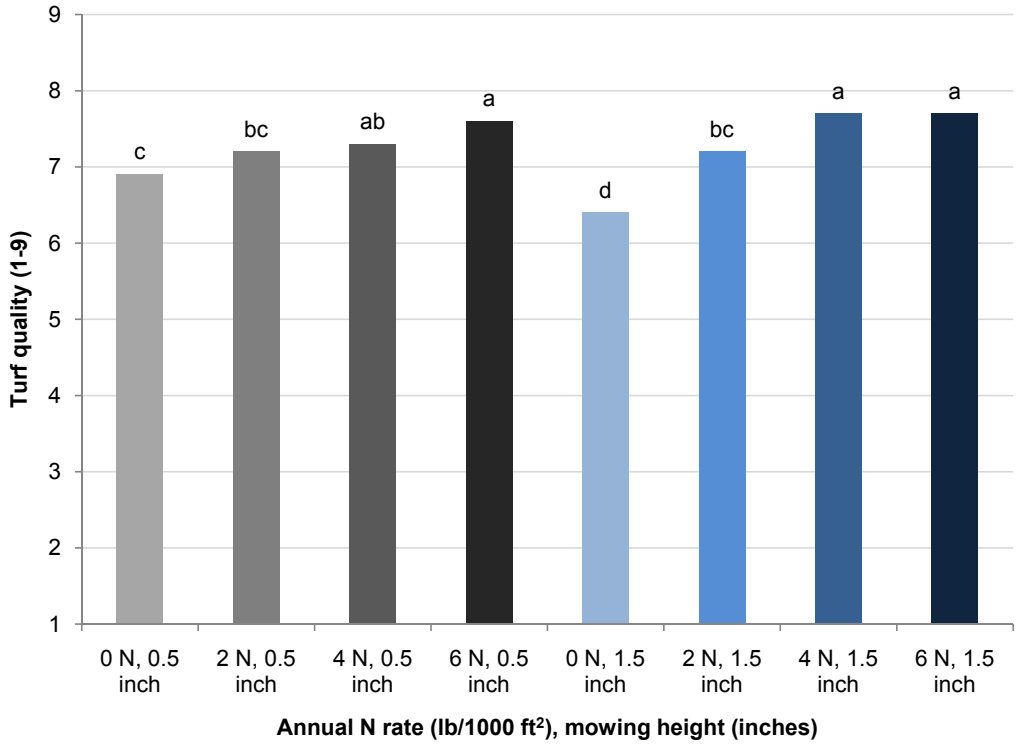

Fig. 3. Influence of mowing height and nitrogen fertility on zoysiagrass turf quality across three zoysiagrass cultivars on 16 October 2009. Means followed by the same letter are not significantly different according to Fisher's protected LSD, α = 0.05.

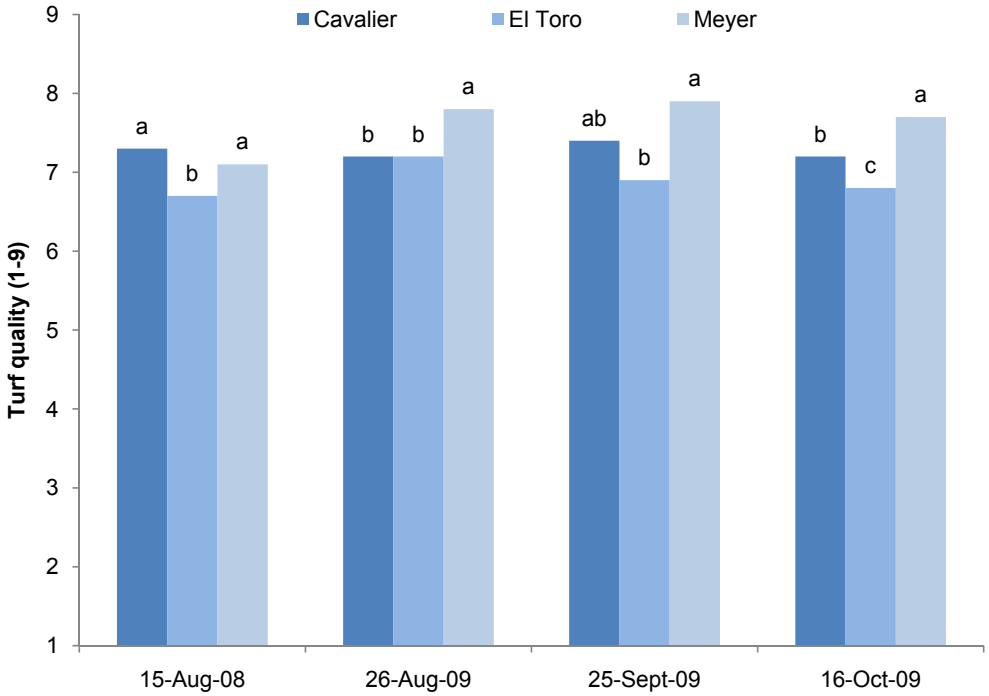

Fig. 4. Influence of cultivar on turf quality across four rating dates. Within date, means followed by the same letter are not significantly different according to Fisher's protected LSD, α = 0.05.