Drought Tolerance of Kentucky and Hybrid Bluegrass Cultivars

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Photo by Mike Richardson

Fixed-roof rainout shelter used to impose drought stress on bluegrass plots.

Summary. Newer cultivars of Kentucky bluegrass and hybrid bluegrass may have improved drought tolerance and expanded the range of cool-season turfgrasses for home lawn use in Arkansas. The objective of this research was to compare the drought tolerance of 24 cultivars or experimental lines of these species when maintained as a lawn. Cultivars were established in fall, 2007 and dried down during the summer of 2008 and 2009 in a rain-out shelter, which prevented rainfall from reaching the plots. Green turf coverage was evaluated twice weekly as the cultivars were subjected to drought stress. Data are reported from the 2009 dry-down study. The amount of time after irrigation was withheld until green turf coverage dropped to 50% varied by approximately two weeks among cultivars. In general, cultivars that have performed well (Mallard) or poorly (Solar Green) in previous trials performed similarly in the present study, suggesting that the methodology is consistent. Several Kentucky bluegrass and two hybrid bluegrass cultivars had the best drought tolerance in the present trial.

Abbreviations: KBG, Kentucky bluegrass; HBG, hybrid bluegrass

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A desirable trait of cool-season lawn grasses, such as Kentucky bluegrass (*Poa pratensis*), is that they stay relatively green throughout most of year and do not go into complete winter dormancy like bermudagrass (*Cynodon* spp.) or zoysiagrass (*Zoysia* spp.). The use of cool-season grasses for Arkansas lawns has been limited to northern regions of the state due to their poor heat and drought tolerance relative to warm-season grasses. In recent years, hybrid bluegrass cultivars, which are crosses between Kentucky bluegrass and Texas bluegrass (*P. arachnifera*), have been released as a cool-season lawn turf option with improved heat and drought tolerance (Abraham et al., 2004). In addition, it has recently been demonstrated that there is variation in drought tolerance among cultivars of Kentucky and hybrid bluegrass species (Richardson et al., 2008; Richardson et al., 2009). Identifying cultivars of Kentucky bluegrass and hybrid bluegrass with excellent drought tolerance may expand the use of cool-season turfgrasses for lawns in Arkansas and throughout the transition zone. Research was initiated recently to compare the relative drought tolerance of 24 Kentucky bluegrass and hybrid bluegrass cultivars. The following is a summary of the drought tolerance data from that study.

Materials and Methods

This research was conducted at the University of Arkansas Agricultural Research and Extension Center in Fayetteville. Twenty cultivars of Kentucky bluegrass and four cultivars of hybrid bluegrass (Table 1) were seeded into three replicate plots in the fall of 2007 on a native soil experimental area that was constructed under a rain-out shelter. The experimental area was maintained as a home lawn and was mowed weekly at a 2-inch height of cut. On 12 June 2009, the experimental area was saturated with 2 inches of irrigation to ensure uniform soil moisture across the plots. Immediately thereafter, drought stress was initiated by discontinuing irrigation. The rain-out shelter has a fixed-roof that prevents any rainfall from reaching the plots. Digital images were collected from each plot regularly during drought stress to evaluate green turf coverage over time and determine the drought tolerance characteristics of each cultivar. Non-linear regression (using a variable slope, Sigmoid curve) was performed on the digital image analysis data to predict $Days_{50}$ values for each cultivar, which are the estimated number of days after irrigation was withheld until green turf coverage decreased to 50%. A complete description of digital image analysis and statistical methods are presented elsewhere (Karcher et al., 2008).

Results and Discussion

The number of days after irrigation was withheld until green turf coverage dropped to 50% ranged from 15.8 d for Solar Green hybrid bluegrass to 28 d for A00891 Kentucky bluegrass (Table 1). This range of 12 d is smaller than we observed in earlier trials (Richardson et al., 2008; Richardson et al., 2009), but may reflect a difference in temperature between trials conducted at this site and earlier trials conducted in western Oregon. However, it is significant to note that cultivars such as Mallard, which have performed very well in previous trials, continued to perform near the top of the present trial (Table 1). In addition, Solar Green was a cultivar with poor drought tolerance in previous trials and also performed poorly in the current trial.

There were four hybrid bluegrass cultivars in this trial and their drought tolerance ranged from very good (Reveille and A04TB-275) to very poor (A03TB-676 and Solar Green). This is similar to results from earlier trials (Abraham et al., 2004; Richardson et al., 2009) and continues to support the premise that hybrid bluegrasses are not inherently more drought tolerant than Kentucky bluegrass and must be tested to verify those claims.

Conclusions

These results continue to demonstrate that there are significant differences in drought tolerance among cool-season grasses used in Arkansas lawns and that numerous Kentucky and hybrid bluegrasses could be valuable in limited water sites. Drought tolerance screening should be performed routinely on these species so that cultivars may be selected that are best adapted for lawns where irrigation in not available or is limited.

Literature Cited

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Table 1. Drought tolerance of 24 Kentucky bluegrass and hybrid bluegrass entries, as measured by days without water required to reach 50% green cover.

Selection	Species[z]	Days50[y]	(SE)[x]
A00-891	KBG	28.1	0.20
Reveille	HBG	27.9	0.59
Limousine	KBG	27.7	1.40
Mallard	KBG	27.5	1.57
AKB449	KBG	26.4	0.47
A04TB-275	HBG	25.5	1.44
Eagleton	KBG	25.3	0.43
Bluestone	KBG	25.0	1.02
KH3010	KBG	25.0	0.38
AKB262	KBG	24.6	0.91
Brooklawn	KBG	24.5	1.90
AKB186	KBG	24.4	0.69
KH9739	KBG	24.2	1.14
Blue Ridge	KBG	24.0	0.81
Diva	KBG	23.8	0.96
Midnight	KBG	23.6	0.71
A98-948	KBG	21.1	1.18
Bedazzled	KBG	21.0	0.95
AKB254	KBG	20.2	1.02
KH2290	KBG	20.2	1.22
A03TB-676	HBG	19.5	1.14
Monte Carlo	KBG	19.0	0.97
Hunnington	KBG	16.7	0.23
Solar Green	HBG	15.8	0.88

[z]KBG – Kentucky bluegrass, HBG – hybrid bluegrass.
[y]Days50 – number of days after water was withheld for a cultivar to reach 50% green cover.
[x]SE – standard error of the Days50 value.