2015-18-533

Title: Response of Seven Seeded Low Maintenance Grasses to Less than Optimum Irrigation.

Project Leader: David Kopec
Affiliation: University of Arizona
Objectives: Determine turfgrass performance of seven seeded low maintenance grasses when irrigated with different ET replacement values.
Start Date: May 2017.
Duration: 1 year – as USGA project

KEY BULLETS:

- During the peak period of drought in mid-July, the following grasses produced a minimal turf surface (NTEP quality of at least 4.0= no less than 80% green plot cover, utility turf) at the lowest ET replacement values: Jackpot bermudagrass (25%), Wrangler bermudagrass (25%), and SunDancer bufflaograss (25%).

- During the peak period of drought in mid-July, the following grasses produced a nominal turf surface (NTEP quality of at least 5.0= just less than fully acceptable conditions for fairway, but acceptable for secondary rough otherwise) at the lowest ET replacement values: All three buffalo grasses (35%), Jackpot and Wrangler bermudagrass (35%).

SUMMARY*:*

On a per unit ground basis, many golf courses have undergone reductions in turf areas, based on identifying areas which have minimal player contact, and overall hole-changing and rating considerations.

With these concepts in mind, a study was established in 2015 to evaluate commercially available seeded-type low maintenance grasses that could be used on golf course landing zones and other areas which would otherwise be in out-of-bounds areas, or in areas that receive lesser amounts of traffic. If such grasses afford a suitable grass cover (as opposed to weeds, soil, or hardscapes) and have the added benefit of doing so under less than standard irrigation amounts for existing turfs, then this too would be another successful component of water savings of turf. As such, four cultivars of low

maintenance bermudagrass, and three buffalograsses (representing three generations of turf-type development) were tested in 2017 using a special field arrangement referred to as a Linear Irrigation Gradient (or LIGA) design.

This special irrigation design applies a continuous gradient of water from the center sprinkler line that decreases in relative amount with distance to end of the sprinkler radius of throw. The LIGA design here applied irrigation replacement amounts at 75, 65, 55, 45, 35, and 25% of reference ET.

The irrigation test started on May 13th and ended on Oct 22nd. The test was irrigated nightly, based on the previous days reference ET (midnight to midnight), from an on-site weather station and a Rain Bird PC irrigation control system.

All plots were mowed at 3.0 inches with a walk behind 22" rotary mower with clippings bagged (to avoid bermudagrass contamination). The test was fertilized with 1/2 lb. of nitrogen/ 1000 ft^2 on 3 occasions as needed using a slow release urea. The plots were observed for living density, absence/presence of any dead turf, all of which were "captured" in the visual assignment of overall turfgrass quality. Using the NTEP visual rating scale, all 168 plots of turf received quality scores on eight evaluation dates from May 27th to October 21st 2017, when short day lengths started to trigger the beginning of fall dormancy.

Results

For each grass, the questions to answer are, what is the ET replacement level that is required to provide a minimal utility turf (4.0 for quality) and that of a nominal low maintenance turf (5.0 for quality).

Table 1 shows the minimum ET required to achieve a utility turf (*4.0 or greater* NTEP quality) at the peak of the drought in July, and at the end of the trial in October 2017. Jackpot and Numex-Sahara did so at 25% ET replacement, while the other five grasses did so at 35%. Note that at the 35% level, all three buffalograss entries had better quality scores than the bermudagrass entries, when achieving the minimum quality requirement of at least 4.0 for a utility turf. To close the trial with the same requirement of at least 4.0 at the end of October, all seven grasses needed 45% ET replacement, as Wrangler bermudagrass and all three buffalograss turfs had slightly better quality than Numex-Sahara, Jackpot, and Cheyenne II as utility turfs.

Table 2 shows the minimum ET required to achieve a nominal quality turf (5.0 minimum NTEP quality) at the peak of the drought in July, and at the end of the trial in October 2017. All three bermudagrass cultivars as well as Jackpot and Wrangler bermudagrass achieved nominal turfgrass quality (*5.0 or greater)* at 35% ET irrigation, while Nu-Mex Sahara and Cheyenne did so at 45%, noting that a slightly higher quality was realized for those two bermudagrass entries when meeting that basic quality requirement. At the end of the trial, all three seeded buffalograss cultivars did so at 45% ET irrigation. All of the bermudagrass cultivars required 55% ET replacement at end of season to close the trial with a minimum quality of 5.0. Nu-Mex Sahara and Wrangler had achieved slightly higher quality scores (6.0) as part of that requirement.

Table 1. ET replacement irrigation level which maintained seven seeded low maintenance grasses at a utility turfgrass quality (***4.0 or greater***) at the peak of drought in in late [July], and at the end of the trial on [Oct 22], 2017. University of Arizona.

		ET replacement Level					
		0.25	0.35	0.45	0.55	0.65	0.75
Grass	Cultivar						
Buffalograss	Bison		[5.0]	[5.5]			
	TopGun		[5.3]	[5.5]			
	SunDancer		[5.5]	[5.5]			
Bermudagrass	Nu-Mex Sahara		[4.8]	[4.8]			
	Jackpot	[4.0]		[4.8]			
	Cheyenne II		[4.5]	[4.5]			
	Wrangler	[4.0]		[5.5]			

ET replacement value = Percentage of Reference ET(0) from on site weather station using standardized Penman Monteith equation.
Quality: 1=dead, =utility grade, 5=nominal/acceptable for rough, 6=faiway acceptable, 9=best possible.
Values are the mean of replications per each grass/ET replacement level combination.
Red value is grass mean quality score during peak drought, blue value is at end of trial, October 2017.

Table 2. ET replacement irrigation level which maintained seven seeded low maintenance grasses at nominal utility turfgrass quality (***5.0 or greater***) at the peak of drought in in late [July], and at the end of the trial on [Oct 22], 2017. University of Arizona.

		ET replacement Level					
		0.25	0.35	0.45	0.55	0.65	0.75
Grass	Cultivar						
Buffalograss	Bison		[5.0]	[5.3]			
	TopGun		[5.3]	[5.5]			
	SunDancer		[5.5]	[5.5]			
Bermudagrass	Nu-Mex Sahara			[6.0]	[6.0]		
	Jackpot		[5.3]		[5.8]		
	Cheyenne II			[6.0]	[5.5]		
	Wrangler		[5.5]		[6.0]		

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Figure 1. Four cultivars of low maintenance bermudagrass, and three buffalograsses (representing three generations of turf-type development) were tested in 2017 using a special field arrangement referred to as a Linear Irrigation Gradient (or LIGA) design, which was audited to estimate the precipitation rate gradient.

Figure 2. This Linear Irrigation Gradient (or LIGA) design applies a continuous gradient of water from the center sprinkler line that decreases in relative amount with distance to end of the sprinkler radius of throw. The LIGA design here applied irrigation replacement amounts at 75, 65, 55, 45, 35, and 25% of reference ET. Note poorer quality at the ends of plots where irrigation was least.