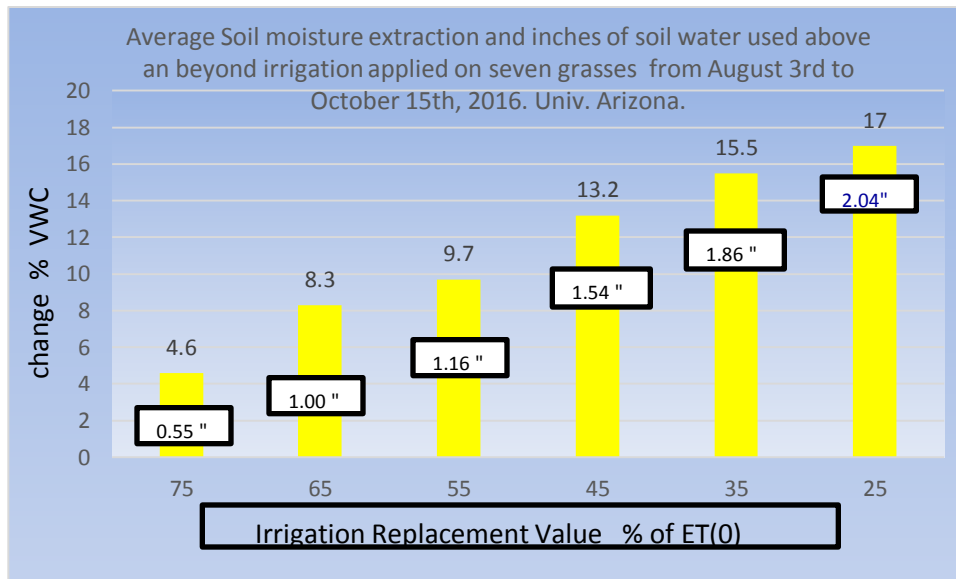


“Low Maintenance Grasses for Water Conservation”

D.M .Kopec, J.J. Gilbert, N .Leitner and M .Pessaraki. University of Arizona.

Golf courses in the southwest remain under continuous pressure to reduce water use, even though significant reductions in applied irrigation have been realized through the use of ET based irrigation, soil moisture sensor based irrigation scheduling, and improved sprinkler head nozzle technology. There are areas on both large acreage golf and target-style courses which may be targets for reduced water use. Such areas include (1) wide landing zones and (2) “off rough” areas on smaller sized target courses which are either desert, gravel or other non-playable surfaces. This project addresses the water use of seven low maintenance warm season grasses which may have the potential to be used on such areas. Three buffalograss cultivars representing three generations of turf-type development and four low maintenance bermudagrasses were established in 2015 in a Linear irrigation gradient (LIGA) design with 50 foot long plots, replicated 4 times. Irrigation ET replacement plots were 75%, 65%, 55%, 45%, 35% and 25% of on-site Reference ET using the standard Penman-Monteith equation. Turfs were mowed weekly at 3.0 inches and irrigated nightly. Plots were scored for color, quality, density and percent plot cover using the NTEP visual rating system. Chlorophyll Index (C.I.,) values were taken using a Spectrum Technology Field Scout CM 1000 Chlorophyll meter, and digital estimates of percent plot cover was taken using the ‘*Canopeo*’ smart phone application developed by Oklahoma State University. Volumetric water content was determined for the 12 inch soil depth on August 3rd and again on Oct 22nd. By the end of the trial in late October, all 3 seeded buffalograsses and 3 of the seeded bermudagrasses required 45% ET replacement to maintain quality (at least 5.0 minimum at all times), while seeded Wrangler bermudagrass did so at 35% ET replacement. In order to maintain a fully acceptable turfgrass (at least 6.0 or greater at all times) all 3 buffalograsses required 55% ET replacement, as did Cheyenne II and Wrangler bermudagrass. Jackpot required 65 ET replacement and Nu-Mex Sahara required 75% ET replacement. The amount of soil water extracted ranged from 2.04 inches for turfs irrigated at 25% of ET, to 0.55 inches for turfs irrigated at 75% of ET. Only at the 25% ET replacement level, was the grass effect significant for the amount of water extracted and total water use (irrigation applied” + soil water extracted”). At 25% ET replacement, Wrangler and Jackpot bermudagrass used the least amount of water statistically (5.5 -5.7 inches), and also extracted the least amount of soil water (1.7-1.9 inches). At all other ET replacement levels, there was no

significant difference between grasses for total water use or amount soil moisture extracted (from August 3rd to October 22nd). Since there were differences in quality among grasses within ET replacement levels, other plant factors would be involved in determining over all turf appearance (quality) in response to differential amounts of applied irrigation. C.I. values were positively correlated with visual turfgrass estimates of percent plot green, and the turfgrass INDEX (sum of the NTEP scores for color, quality and density) as simple Pearson Product correlations = ranged from 0.79 -0.86, but *Canopeo* percent plot cover values were not strongly correlated with (C.I) values, or any visual parameters at all.



Summary of Environmental condition for LIGA implementation phase, August 3rd to Oct 15th, 2016. Linear irrigation plots , Karsten Turf Center, University of Arizona.			
Parameter	August	September	October
# Days in trial period	28	30	15
Ref ET(o) (inch)	6.89	6.4	15.75
Air Tmax / Tmin (F)	96 / 71	92 / 65	91 / 50
Soil avg. temp@ 4 inch (F)	82	75	68
Rain (inch)	3.79	1.08	0.31
# Days 100 F or more	7	4	0
# Days 95 F or more	20	12	3
# Days 90 F or more	28	22	10
# Days 85 F or more	28	28	15
Ref ET(0) = Penamn - Monteith equation, on site station. Total Ref ET(0) fro 73 day trial = 15.78 inch.			
Rain = rainfall in inches. Rainfall subtracted from Reference ET(0).			

Table 10. ET replacement irrigation level which maintained 7 seeded low maintenance grasses at **marginal** turfgrass quality (5.0 or greater) after 70 days of differential irrigation using the Linear irrigation gradient (LIGA), August 3rd to August Oct 15th, 2016, Univ. Arizona.

Grass	Cultivar	ET replacement Level					
		25%	35%	45%	55%	65%	75%
Buffalograss	Bison				[5.5]		
	TopGun				[5.5]		
	SunDancer				[5.5]		
Bermudagrass	Nu-Mex Sahara				[5.0]		
	Jackpot				[5.5]		
	Cheyenne II				[5.0]		
	Wrangler		[5.3]				

ET replacement value = Percentage of Reference ET(0) from on site weather station using standardized Penman Monteith equation. Total ET (0) from August 3rd to Oct 22nd = 16.04 inches

Quality value =(1-9) 1= dead, 4=poor, 5=marginal, 6= fully acceptable, 9= best possible.

Values are the mean of replications per each grass/ET replacement level combination.

Value in parenthesis is the grass mean turfgrass quality score at end of trial on October 15th, 2016.

Table 11. ET replacement irrigation level which maintained 7 seeded low maintenance grasses at **fully acceptable** turfgrass quality (6.0 or greater) after 70 days of differential irrigation using the Linear irrigation gradient (LIGA), August 3rd to August Oct 15th, 2016, Univ. Arizona.

Grass	Cultivar	ET replacement Level					
		25%	35%	45%	55%	65%	75%
Buffalograss	Bison				[6.3]		
	TopGun				[6.0]		
	SunDancer				[6.3]		
Bermudagrass	Nu-Mex Sahara						[6.5]
	Jackpot					[6.5]	
	Cheyenne II				[6.3]		
	Wrangler				[6.3]		

ET replacement value = Percentage of Reference ET(0) from on site weather station using standardized Penman Monteith equation. Total ET (0) from August 3rd to Oct 22nd = 16.04 inches

Quality value =(1-9) 1= dead, 4=poor, 5=marginal, 6= fully acceptable, 9= best possible.

Values are the mean of replications per each grass/ET replacement level combination.

Value in parenthesis is the grass mean turfgrass quality score at end of trial on October 15th, 2016.

JPEGS

DSCN0568

Outside edge of multiple cultivar entries within the LIGA. Note droughted / low quality turf towards end of plots which receive reduced irrigation.



DSCN0569

Side view of plot with outside edges exhibiting poor quality from low ET replacement treatments.



DSCN0570:

Side view of plot with outside edge of plot producing lower quality turfs from mid to low ET replacement treatments.

