

Stop #7: Wetting Agents for Water Conservation on Bermudagrass Turf

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Justification and Objectives:

Previous research has demonstrated that wetting agents are one of the most important products in a turfgrass water conservation program. Furthermore, Revolution (Aquatrols) and TriCure AD (Mitchell Products) have proven to be among the top products for reducing localized dry spots (LDS) under deficit irrigation. In this study, we aimed to identify “cost effective” products that can help conserve water on large scale areas such as bermudagrass fairways subjected to 45, 55, and 65% ET_{os} irrigation replacement.

Methods:

The study is conducted at the UC Riverside turfgrass research facility in Riverside, CA on mature hybrid bermudagrass ‘Tifway II’ established in 2017. The 60’ x 90’ field is divided into 12 20’ x 20’ plots. From June thru October each year, the plots receive either 45, 55, or, 65% of previous week ET_{os} by hand watering to maximize water distribution uniformity as determined by an on-site CIMIS station. Treatments are arranged in a split-plot design with twelve wetting agent treatments (plot size 24 ft²) randomized within ET_{os} replacement plots and 4 replicates. Treatments (Table 1) are applied according to company recommendations beginning on May 23 each year. Treatments will be tested against an untreated control and Revolution that will serve as “UCR standard”. A 2-wk ‘conditioning period’ followed first application, with deficit irrigation starting on June 6. The study receives 5 lb N/M/year and is mowed at 0.5 in. Spray treatments are applied using a CO₂-powered hand boom sprayer equipped with TeeJet 8004VS nozzles and output of 2 gal/M. All treatments are irrigated with ca. 0.25 in. of water following application with water coming from the previous week’s irrigation budget. Every two weeks, plots are evaluated for turf quality on a scale from 1 = worst to 9 = best, Normalized Difference Vegetation Index (NDVI) using a GreenSeeker instrument, volumetric soil water content (VWC) using time domain reflectometry (TDR), and dark green color index (DGCI) as well as percent cover using Digital Image Analysis (DIA). Leaf samples are collected monthly from May until October to determine proline content in the tissues. Double ring infiltrometer test is also performed monthly from May until October. Visual turf quality and % green cover using DIA will also be taken to measure the effect of wetting agent products on bermudagrass dormancy and green-up in late fall and early spring.

Results

No differences in treatments were found until the end of July, when plots started show differences when irrigated at 55% and 45% ET_{os} . While at 55% ET_{os} Forte+Brilliance

and Passage appear to achieve the best quality and NDVI (Table 2 and 3), when irrigation is further reduced to 45% ET_{os}, TriCure AD and Revolution had the greatest impact on bermudagrass performance (Tables 2 and 3). All plots watered at 55% ET_{os} with the exception of control never dropped below an acceptable quality level of 6; however, at 45% ET_{os} Forte + CounterAct Retain and MPX5 dropped below acceptable quality levels in 2 out of 8 rating dates. Sufficient quality was always sustained at 65% ET_{os} even by the control, and no statistical differences were detectable between treatments (data not shown).

Acknowledgments

Thanks to the CTLF for funding this research and Aquatrols, Exacto, Harrell's, Mitchell Products, Numerator Tech, and Precision Laboratories for providing products.

Table 1. Treatment list for the wetting agent trial (2018-2019) at UCR.

Treatment	Rate	Company	Frequency (weeks)
Untreated control	--	--	
Revolution	6 oz/M	Aquatrols	4
ACA001	4 oz/M	Aquatrols	4
TriCure AD	6 oz/M	Mitchell Products	4
MPX-5	3 oz/M	Mitchell Products	4
Forte + CounterAct Retain	0.37 oz/M + 3 oz/M	Simplot	4
Forte + Brilliance	0.37 oz/M + 3 oz/M	Simplot	4
Aquimax Turf Lateral	8 oz/M (initial)/ 4 oz/M (subsequent)	Exacto	4
Passage	6 oz/M	Numerator Tech	4
Vivax	5 oz/M	Precision Laboratories	4
Cascade Plus	8 oz/M (initial)/ 4 oz/M (subsequent)	Precision Laboratories	4
Hydro90+Symphony	3 oz/M + 3 oz/M	Harrell's	4

Table 2. Visual quality of wetting agent treated plots hand-watered at 55% and 45 ET_{os}.

Treatment	55% ET _{os}			45% ET _{os}		
	7/24	8/7	8/21	7/24	8/7	8/21
Untreated control	5.25b	5.75c	5.25d	4.75b	6.25a	4.5b
Revolution	6a	7ab	7ab	6a	6a	6.5a
ACA001	6a	7ab	6.50abc	6a	6.75a	6a
TriCure AD	6a	6.75ab	6.75abc	6a	6.5a	6.75a
MPX-5	5.75a	6.50abc	6.50abc	5.75a	6.25a	5.5ab
Forte + CounterAct Retain	6a	6.50abc	6.50abc	5.75a	6.25a	5.75ab
Forte + Brilliance	6a	6.75ab	7.50a	6a	6.5a	6a
Aquimax Turf Lateral	6a	6.25bc	5.75cd	6a	6.25a	6.5a
Passage	6a	7.25a	7.25a	6a	6.5a	6.25a
Vivax	6a	7.25a	6.75abc	5.75a	6.25a	6.5a
Cascade Plus	5.75a	6.50abc	6.00bcd	6a	6.75a	6.5a
Hydro90+Symphony	6a	7ab	6.75abc	5.75a	6.25a	6.25a

Table 3. NDVI of wetting agent treated plots hand-watered at 55% and 45 ET_{os}.

Treatment	55% ET _{os}			45% ET _{os}		
	7/24	8/7	8/21	7/24	8/7	8/21
Untreated control	0.61b	0.63c	0.56b	0.52d	0.56c	0.51d
Revolution	0.67a	0.76a	0.68a	0.66a	0.70a	0.67a
ACA001	0.67a	0.73ab	0.65a	0.62abc	0.65ab	0.63abc
TriCure AD	0.66a	0.73ab	0.69a	0.63ab	0.70a	0.67a
MPX-5	0.65a	0.74ab	0.68a	0.55cd	0.62abc	0.58bcd
Forte + CounterAct Retain	0.63ab	0.71ab	0.67a	0.56bcd	0.58bc	0.56cd
Forte + Brilliance	0.65a	0.75a	0.70a	0.59abcd	0.67a	0.64abc
Aquimax Turf Lateral	0.64ab	0.69b	0.64a	0.62abc	0.68a	0.66ab
Passage	0.66a	0.75a	0.68a	0.60abc	0.62abc	0.61abc
Vivax	0.64ab	0.72ab	0.68a	0.59abc	0.68a	0.66ab
Cascade Plus	0.64ab	0.71ab	0.67a	0.61abc	0.67a	0.66ab
Hydro90+Symphony	0.64ab	0.71ab	0.67a	0.62abc	0.69a	0.63abc