

**Stop #4: Evaluation of products to alleviate salinity stress**  
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**Objectives:**

To evaluate the efficacy of products on turf to reduce stress caused by irrigation with saline water.

**Methods:**

The plot area was sodded with 'Tifway II' bermudagrass on 6 August 2012 on a Hanford fine sandy loam with no pre-existing salinity issues. All treatments were applied initially on 4 April 2013. Since November 2012, plots have been irrigated at 75% ET<sub>o</sub> exclusively with water (EC = 4.4 dS/m; see below) that contains the same ion composition as the Colorado River. Every two weeks, plots were evaluated for turf quality, leaf firing, and volumetric soil water content. In addition Digital Image Analysis and leachate are collected on the same day. Soil samples will be collected separately for each treatment and replication to assess salinity build up in the rootzone.

**Chemical properties of saline irrigation water used in this study compared to potable irrigation water used elsewhere at the UCR turfgrass facility.**

	<b>Saline Irrigation Water</b>	<b>Potable Irrigation Water</b>
<b>pH</b>	7.57	7.82
<b>Hardness</b>	938.23	215.18
<b>Bicarbonate</b>	209.84	214.72
<b>Carbonate</b>	0.01	0.01
<b>EC (dS/m)</b>	4.43	0.61
<b>Na (ppm)</b>	523.9	53.36
<b>Cl (ppm)</b>	996.27	31.13
<b>Boron (ppm)</b>	0.11	0.08
<b>SAR (meq/L)</b>	18.3	3.24
<b>Nitrate Nitrogen (ppm)</b>	5.11	5.18
<b>Phosphate (ppm)</b>	0.4	0.01
<b>Potassium (ppm)</b>	129.76	4.16
<b>Magnesium (ppm)</b>	151.99	12.24
<b>Calcium (ppm)</b>	126.03	66
<b>Sulfate (ppm)</b>	707.62	78.1
<b>Manganese (ppm)</b>	0.01	0.01
<b>Iron (ppm)</b>	0.11	0.05

**Results:**

To date, results for salinity alleviation are inconsistent. Only two products (ACA 2994 and Crossover) decreased salinity in leachate water on 2 data collection dates out of 11. ACA 2994 initially increased turf quality in comparison to control until July. Since then, no quality differences in comparison to control have been visible in the study.

### Salinity Alleviation Study Treatment List

No.	Treatment	Company	Rate	Frequency (wks)
1	Untreated Control	--	--	--
2	ACA 3086	Aquatrols	8 oz/M	2
3	ACA 2994	Aquatrols	8 oz/M	2
4	ACA 1849	Aquatrols	3 oz/M	2
5	ACA 1849	Aquatrols	3 oz/M	2
5	Gypsum		5 lbs/M	2
6	ACA 2786	Aquatrols	4.5 oz/M	2
7	Cal-Vantage	EarthWorks	5 oz/M	Earthworks products rotated monthly with Mitchell Products
7	Kick	Earthworks	10 oz/M	
7	Terreplex	Mitchell Products	1.5 oz/M	
7	TriCure AD	Mitchell Products	4 oz/M	
8	MC TP	Mitchell Products	2 oz/M	2
9	MC TP3	Mitchell Products	2 oz/M	2
10	Crossover	Numerator Tech.	5 lb/M	4
11	Revert	Numerator Tech.	6 oz/M	4
12	SST 8%CA	Numerator Tech.	8 oz/M	2
13	pHAcid Sprayable	Numerator Tech.	1.5 oz/M	2
14	Cal Plus	Westbridge Agric.	0.75 oz/M	2
15	Cal Plus	Westbridge Agric.	1.5 oz/M	2
16	DeSal	Ocean Organics	0.75 oz/M	2
16	EXP 2	Ocean Organics	6 oz/M	2
16	EXP 5-0-1	Ocean Organics	6 oz/M	2
17	Displace	Grigg Brothers	12 oz/M	2
17	Carboplex	Grigg Brothers	6 oz/M	2
18	Elicitor	Grigg Brothers	2 oz/M	2
18	Kelpex	Grigg Brothers	2 oz/M	2
19	SumaGrow	Agribiotic Products	5 oz/M	Initial
19	SumaGrow	Agribiotic Products	3 oz/M	2
20	Soil System 1	LH Organics	50 g/18 gal	2 (every other month)
21	UCR001	UCR		Once
22	Turfcare NPN	Gantec	0.1 oz/M	2 (Apr-May)
	Turfcare NPN	Gantec	0.1 oz/M	4 (Jun-Dec)
	Turfcare 6-1-2	Gantec	2.3 lb/M	Apr/May/Jul/Sep

Treatments applied by hand or with CO<sub>2</sub>-powered sprayer and watered in after application.

Plot Plan  
Salinity Alleviation Study  
North

101 1	201 13	301 8	401 16	501 22	601 9
102 2	202 6	302 5	402 21	502 19	602 4
103 3	203 11	303 18	403 1	503 10	603 10
104 4	204 9	304 7	404 13	504 15	604 22
105 5	205 18	305 14	405 11	505 7	605 13
106 6	206 1	306 4	406 17	506 21	606 5
107 7	207 12	307 19	407 3	507 12	607 11
108 8	208 10	308 16	408 15	508 20	608 18
109 10	209 4	309 21	409 22	509 3	609 19
110 9	210 20	310 2	410 4	510 16	610 15
111 11	211 14	311 1	411 19	511 5	611 7
112 12	212 8	312 17	412 14	512 18	612 17
113 13	213 2	313 11	413 9	513 1	613 20
114 14	214 5	314 3	414 7	514 8	614 3
115 15	215 21	315 6	415 2	515 13	615 2
116 16	216 19	316 12	416 20	516 6	616 14
117 17	217 16	317 15	417 10	517 11	617 21
118 18	218 3	318 9	418 6	518 17	618 8
119 19	219 15	319 22	419 12	519 14	619 1
120 20	220 7	320 13	420 18	520 2	620 12
121 21	221 22	321 10	421 5	521 9	621 16
122 22	222 17	322 20	422 8	522 4	622 6

Soil test results for study area before and after application of saline irrigation and product treatments.

<b>Soil Properties</b>																		
Date	Before Saline Irrigation Treatment	Before Product Treatment Applications	Control	Treatment 3	Treatment 7	Treatment 10	pH	OM%	Bulk Density	EC (dS/m)	SAR	Olsen P ppm	K ppm	Ca ppm	Mg ppm	Na ppm	Cation Exchange Capacity	Soluble Salts (dS/m)
Nov. 2012							6.6	0.01	0.14	6.5	0.81		261	1904	202	79	12.2	2.45
Apr. 2013							7.7	1.1	1.46	2.13	4.79	29.6	159	1653	351	283	12.8	0.64
Aug. 2013							7.8	0.8	1.58	7.33	8.67	19.1	215	1534	425	487	13.9	0.85
Aug. 2013							7.7	1	1.43	5.69	7.99	20.8	189	1346	375	450	12.3	0.79
Aug. 2013							7.5	1.1	1.55	3.23	6.74	20	230	1313	382	413	12.1	0.71
Aug. 2013							7.7	1.2	1.48	4.24	6.98	21.7	253	1428	384	386	12.7	0.72