Stop #5: Management of Salinity and Rapid Blight Disease on Annual Bluegrass Putting Greens

Marco Schiavon, Pawel Petelewicz, Antonio Verzotto, Magdalena Poleska,
Pawel Orlinski and Jim Baird
Department of Botany and Plant Sciences
University of California, Riverside, CA 92521

Objectives:

1) To evaluate the efficacy of products on a *Poa annua* green to reduce stress caused by irrigation with saline water.
2) To evaluate which treatments can effectively control rapid blight disease under saline conditions.

Methods:

A new 5,400-ft^2 research putting green was constructed in 2017. Rootzone was comprised of 8 inches of sand/peat/soil with physical properties conforming to USGA recommendations, but simulating a mature putting green with minimum suggested infiltration rate. *Poa* annua was established in the spring using aeration cores from Mesa Verde Country Club in Orange County. Once established, turf was mowed at 0.110 inches 5 times/week using Baroness walk mower, rolled weekly, topdressed monthly with sand, and received 0.125 lbs N/M and Primo Maxx at 0.125 oz/M every two weeks. Starting on June 23, plots were irrigated with saline water (2.0 dS/m) at 100%ET replacement. The 60' x 90' area was divided into six 30' x 30' areas. Two irrigation methods were replicated 3 times inside the study area:

a) Frequent shallow irrigation: plots are irrigated every day; on Friday plots will be watered with higher volumes in order to simulate a weekly "light flushing".
b) Irrigation on Mon-Wed-Fri.

Salinity is leached when ECe in the last treatment in one replication will reach 2.0 dS/m. Every two weeks, plots were evaluated for turf quality on a scale from 1 = worst to 9 = best, volumetric soil water content (VWC) and soil Electrical Conductivity (EC_e) using POGO, and Naturalized Difference Vegetation Index (NDVI) and Dark Green Color Index (DGCI) using Digital Image Analysis (DIA). Leachate is also collected and analyzed for electrical conductivity (EC_L) on the same day. In addition, disease cover, turf quality, turf cover and turf injury ratings were taken for Rapid Blight treatments on a weekly basis. Also, NDVI, DIA, VWC and EC_e (both using POGO) are taken on this part of trial, but on a biweekly basis.

Treatments were applied by hand or using a calibrated CO_2 boom sprayer (TeeJet 8004VS nozzles; 2 gal/1000 ft^2). Treatments for salinity alleviation trial were watered in with over 1 cm of water immediately following application. Therefore, application of

salinity alleviation treatments was rotated every other week with rapid blight treatments starting at the onset of saline irrigation. For treatment lists, see tables on next page.

Results:

During the first month of the study a significant amount of *Poa* was lost due to drought stress from high temperatures and ET rates, and before irrigation volumes were increased to 130%ET replacements. Neither salinity nor rapid blight was responsible for initial loss of *Poa*. Irrigation regime had a greater effect on *Poa* quality and soil salinity, with deep, infrequent irrigation performing better at the beginning of the study, but rapidly losing quality while ECe was increasing, and being surpassed by shallow irrigation without leaching (Figs. 1 and 2). Treatment did not have a significant impact on turf quality improvement thus far although highest quality was achieved by DeSal+StressRx+XPMicro and Nutrimend+Komodo Pro (Table 1).

Given initial turf loss due to drought stress, it was difficult to determine if turf thinning/loss was due to rapid blight disease. However, turf quality and cover results suggest that the disease might be active (Table 3). These data and data collected on September 10 (data not shown) indicate highest turf quality and cover from A19188A, Lexicon, Velista and Secure, and Velista. Lowest quality and cover were observed in the untreated control. Lexicon is known to provide effective control of Rapid Blight. In addition, studies conducted by UCR in Northern California in 2014 and 2015 demonstrated that A19188A, Velista, and Secure were also effective against Rapid Blight disease. Confirmation of the causal agent of Rapid Blight (*Labyrinthula terrestris*) is pending.

Acknowledgments:

Thanks to Aquatrols, Grigg Brothers, Ocean Organics, Solutions 4Earth, BASF, Bayer, NuFarm, Syngenta, Mesa Verde Country Club, P.W. Gillibrand Co., Inc., Golf Course Superintendents Association of Southern California, and the California Turfgrass & Landscape Foundation (CTLF) for supporting this research.

Table 1. Treatments evaluated for alleviation of salinity stress. Riverside, CA. 2017.

No.	Treatment	Company	Rate	Frequency (wks)	Quality (Overall)
1	Untreated Control	--	--	--	5.5
2a	UMAXX	-	0.02 lb/M	2	5.4
2b	Revolution	Aquatrols	6 oz/M	4	
3	Megalex (3-0-0)	Grigg Brothers	7.3 oz/M	2	5.7
4a	Safe Zone (0-0-13)	Grigg Brothers	1 gal/A	4	5.1
4b	Aqua Pam		2 gal/A	4	
5	Nutricor (5-4-4)	Solutions 4Earth	15 fl oz/M	1	5.6
6a	NutriMend (10-3-0)	Solutions 4Earth	16 fl oz/M	1	6.1
6b	Komodo Pro (0-0-16)		8 fl oz/M	1	
7a	NutriMend (10-3-0)	Solutions 4Earth	16 fl oz/M	2	5.6
7b	Komodo Pro (0-0-16)		8 fl oz/M	2	
8a	DeSal	Ocean Organics	0.75 oz/M	2	6.1
8b	StressRx		6 oz/M	2	
8c	XP Micro		6 oz/M	2	
9a	DeSal	Ocean Organics	0.25 oz/M	2	5.7
9b	StressRx	Aquatrols	6 oz/M	2	
9c	XP Micro		6 oz/M	2	
9d	EXP SF1		6 oz/M	2	
10a	UCR001	--	3.5 oz/M	2	5.3
10b	UCR002		6 oz/M	2	
11a	UCR003	--	1.2 oz/M	2	6.0
11b	UCR002		6 oz/M	2	
11a	UCR001	--	0.56 oz/M	2	5.2
11b	UCR002		6 oz/M	2	
11c	UCR003		3.5 oz/M	2	

Treatment 1 in salinity alleviation trial treated with 2-week rotation of treatments 18 and 23 from Rapid Blight trial (below).

Table 2. Fungicide treatments evaluated for Rapid Blight control. Riverside, CA. 2017.

No.	Treatment	Rate (oz/M)	Frequency (wks)
13	Untreated Control	-	-
14	JR1	3	2
	JR2	0.366	2
15	JR1	3	2
	JR2	0.366	2
	Compass	0.2	2
16	JR1	6	2
	JR2	0.732	2
17	JR1	6	2
	JR2	0.732	2
	Compass	0.2	2
18	Lexicon	0.34	2
19	Affirm	0.88	2
20	NUP-15014	1.3	2
21	Rotator	0.5	2
22	Velista	0.7	2
23	Velista	0.5	2
	Secure	0.5	2
24	A19188A	1	2

Plot Plan

12 F 4 Application Map

N ↑

Rep 1, 2

A										**B**
	13	**1**		**7**	19	22	**5**		**4**	17
	14	**2**		**8**	20	16	**10**		**6**	23
	15	**3**		**9**	21	24	**8**		**11**	20
	16	**4**		**10**	22	21	**2**		**1**	18
	17	**5**		**11**	23	13	**12**		**3**	19
	18	**6**		**12**	24	15	**7**		**9**	14

Rep 3, 1

C										**D**
	19	**5**		**8**	22	18	**6**		**1**	24
	18	**11**		**3**	15	15	**7**		**5**	14
	24	**4**		**6**	17	22	**2**		**4**	13
	13	**12**		**9**	14	19	**12**		**8**	23
	23	**10**		**7**	21	21	**11**		**3**	16
	16	**2**		**1**	20	20	**9**		**10**	17

Rep 2, 3

E										**F**
	16	**12**		**2**	15	20	**8**		**5**	21
	22	**10**		**6**	13	17	**11**		**4**	16
	23	**8**		**11**	18	14	**12**		**3**	22
	24	**9**		**3**	20	18	**10**		**6**	19
	14	**1**		**7**	17	24	**7**		**1**	15
	19	**5**		**4**	21	23	**9**		**2**	13

Figure 1. Quality of plots watered either every day (shallow irrigation), or only 3 times per week (deep, infrequent irrigation) with saline water. Riverside, CA. 2017.

Figure 2. Soil Electrical Conductivity (ECe) of plots watered either every day (shallow irrigation), or only 3 times per week (deep, infrequent irrigation) with saline water. Riverside, CA. 2017.

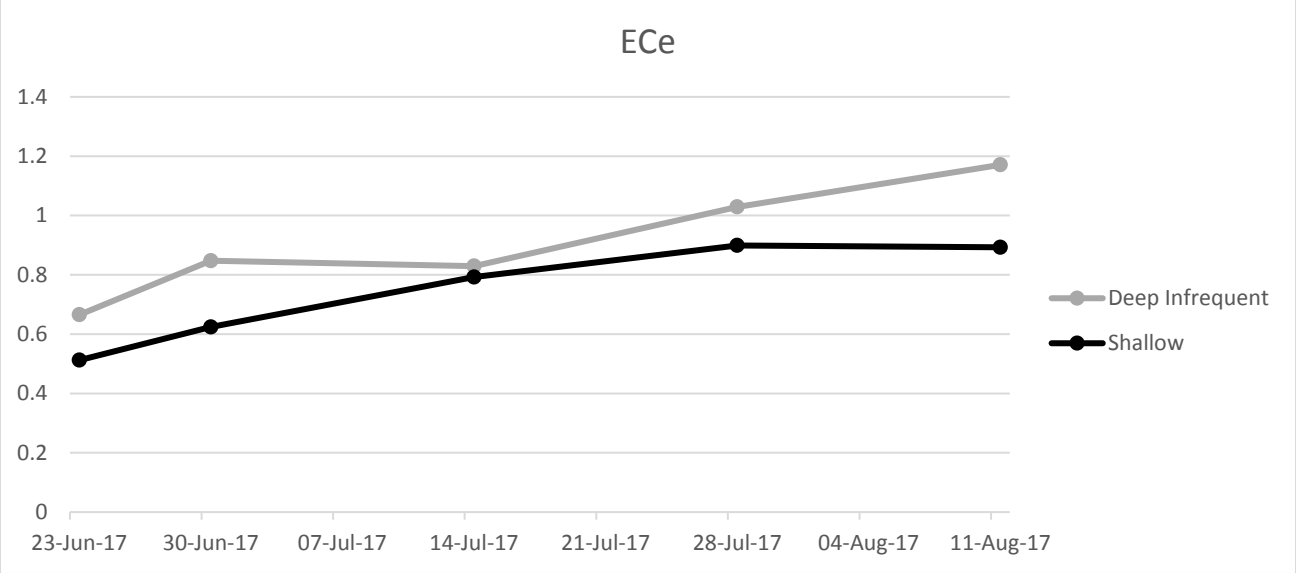

Table 3. Effects of fungicides on turf quality [1-9] and turf cover [%] on a Poa annua putting green irrigated with saline water. Riverside, CA. 2017.

No.	Treatment	Turf quality [1-9] 08/22/2017		Turf cover [%] 08/22/2017	
1	Untreated Control	2.67	B	51.83	ABC
2	JR1 (3 oz/M) JR2 (0.366 oz/M)	3.17	AB	74.17	AB
3	JR1 (3 oz/M) JR2 (0.366 oz/M) Compass (0.2 oz/M)	3.17	AB	61.67	ABC
4	JR1 (6 oz/M) JR2 (0.732 oz/M)	2.83	B	40.83	C
5	JR1 (6 oz/M) JR2 (0.732 oz/M) Compass (0.2 oz/M)	3.17	AB	50.83	BC
6	Lexicon (0.34 oz/M)	4.00	AB	80.83	AB
7	Affirm (0.88 oz/M)	3.00	AB	61.00	ABC
8	NUP-15014 (1.3 oz/M)	2.67	B	57.50	ABC
9	Rotator (0.5 oz/M)	3.50	AB	73.33	AB
10	Velista (0.7 oz/M)	3.67	AB	65.00	ABC
11	Velista (0.5 oz/M) Secure (0.5 oz/M)	3.50	AB	75.83	AB
12	A19188A (1 oz/M)	4.33	A	81.67	A

Means followed by the same letter in a column are not significantly different (P=0.05).