A Salty Situation

Paul G. Johnson

Decision maker:

Dirk Burdick, superintendent at River Oaks Golf Course in Sandy, Utah.

This is a relatively new course at the higher end of typical public golf courses. Obviously, income from the course is important.

Decision/Dilemma:

Its July in Utah, and a severe drought is underway – severe even for Utah. The temperatures have been high so irrigation is important.

The quality of the turf is quickly going down. Some people seem to think it's a disease problem. What do you think? and how would you deal with the situation in the short and long term? Details on the situation follow.

Issues and information:

Dirk called up a salesman that he often consults with. The salesman says it looks like a disease problem, maybe take all patch (*Gaeumannomyces graminis*) and recommends Heritage, a fungicide labeled to control the problem.

Dirk later calls up the state turf specialist to get his take on the situation. The specialist has some doubt about the diagnosis because (1) he knows the salesman wants to sell product, which he already did, and (2) the dry conditions are not conducive to that much disease development. However, the golf course is in a low area near the Jordan River.

Some additional details that Dirk shared with the state turf specialist:

- Most of the problem seems to be on sand greens planted with L-93 creeping bentgrass.
- The L-93 greens are being mowed at 3/16" and are quite thatchy and somewhat puffy in feel and appearance.
- Native soil greens and fairways do not have as much or any turf problems.
- Fairways are planted in perennial ryegrass.

Still none of the scenarios seem satisfying. Dirk then comments that he has been seeing the same symptoms on his oak trees. Does this change the direction of the mystery? It should. Why?

The specialist asks Dirk if there were any changes in his management, say 10-14 days ago. Dirk responds by saying he has been very careful with watering to prevent disease, by keeping everything on the dry side. Also, there had been a change of water supply. Because of the drought, their primary water source was changed from Dry Creek, their normal source of water, to Tremble Creek (essentially water from the Jordan River) – known for its poor water quality,

especially in the latter half of the summer. You ask Dirk for soil and water samples (See Exhibits 1-8).

Dirk needs to know what to do in the short term to keep his greens from frying up. Since the results from the samples won't be available for a few days, what should he do?

Exhibit 1: Soil sampling done the previous fall by a commercial soils testing lab.

Sample Description	FWY7	#9FWY	FWY15	PRACTICE GREEN
CEC	33.9	29.7	21.2	13.3
Soil pH	8.3	8	8.5	9.4
Buffer pH				
Soluable Salts	1.36	4.66	0.72	0.21
Exchangeable Calcium (Ca)	4546	4364	3445	2391
Exchangeable Magnesium (MG)	883	613	235	103
Exchangeable Sodium (Na)	535	444	253	80
% H Base Saturation	0	0	0	0
% K Base Saturation	4.4	2.7	4.2	1.3
% Mg Base Saturation	21.8	17.2	9.2	6.4
% Ca Base Saturation	67	73.5	81.3	89.7
% Na Base Saturation	6.7	6.5	5.2	2.6

Exhibit 2: Water analysis from Tremble Creek three years ago by a commerical lab.

Analysis Of Chemical Properties

		Your Results			Rating Of Your Results		
		unit of measure	result	lbs/ acre foot	Satisfactory	Possible Problem	Probable Problem
Water Characteristics	pH		8		######		
	Hardness		731.3		################################		
	Bicarbobate	ppm	405	1101.6	################		
	Carbonate	ppm	12	32.6	##########		
Impact on General Plant Growth	Electrical Conductivity(Ecw)	mmhos/cm	2.28		################		
	Total Soluable Salts	ppm	1459	3969	################		
Impact From Root Contact	Sodium	meq/l	9.22		######################		
	Chloride	ppm	292	794	################		
	Boron	ppm	0.42	1.1	########		
Impact From Foliage Contact	Sodium	ppm	212	577	###################		
	Chloride	ppm	292	794	###################		
Impact On Soil Structure	Sodium Absorbtion Ratio Adj.	meq/l	9.1		###################		
	Electrical Conductivity (Ecw)	mmhos/cm	2.28		#		
	Total Soluable Salts	ppm	1459	3969	#		
					No anticipated dificulty.	Some difficulty	Significant difficulty

Exhibit 3: Analysis of Nutrients for the water sample of in exhibit 2.

Analysis of Nutrients

Plant nutrients as normally reported in water anaylsis	Results as ppm	Nutrients converted to basic fertilizer material forms	Results lb/acre ft		**MEQ/L**	
Nitrate (NO3)-N)	4.94	Nitrogen (N)	13.4	cations	K+	0.25
Phosphate(PO1)	0.01	Phosphate (P2O5)	0.02		Na+	9.22
Potassium (K)	9.6	Potash (K2O)	31.1		CA++	8.57
Magnesium (Mg)	73.5	Magnesium Oxide (MgO)	330.8		MG++	6.04
Calcium (Ca)	171.7	Calcium (Ca)	467			
Sulfate (SO1)	500	Sulfur (S)	450	anions	CL-	8.23
Manganses (Mn)	0.01	Manganses (Mn)	0.03		SO4--	10.42
Iron (Fe)	0.01	Iron (Fe)	0.03		HCO3-	6.64
Boron (B)	0.12	Boron (B)	1.1		CO3--	0.4

Total Cations	24.08
Total Anions	25.68

Exhibit 4: Water analysis from Dry Creek three years ago by a commerical lab.

Analysis Of Chemical Properties

		Your Results			Rating Of Your Results		
		unit of measure	result	lbs/ acre foot	Satisfactory	Possible Problem	Probable Problem
Water Characteristics	pH		8		######		
	Hardness		610		################################		
	Bicarbobate	ppm	368	1001	################		
	Carbonate	ppm	14	38	##########		
Impact on General Plant Growth	Electrical Conductivity(Ecw)	mmhos/cm	2.11		################		
	Total Soluable Salts	ppm	1350	3673	################		
Impact From Root Contact	Sodium	meq/l	11.48		###################		
	Chloride	ppm	372	1012	################		
	Boron	ppm	0.42	1.1	########		
Impact From Foliage Contact	Sodium	ppm	264	718	###################		
	Chloride	ppm	373	101	###################		
Impact On Soil Structure	Sodium Absorbtion Ratio Adj.	meq/l	11.88		###################		
	Electrical Conductivity (Ecw)	mmhos/cm	2.11		#		
	Total Soluable Salts	ppm	1350	3673	#		
					No anticipated dificulty.	Some difficulty	Significant difficulty

Exhibit 5: Analysis of Nutrients for the water sample of in exhibit 4.

Analysis of Nutrients

Plant nutrients as normally reported in water anaylsis	Results as ppm	Nutrients converted to basic fertilizer material forms	Results lb/acre ft		**MEQ/L**	
Nitrate (NO3)-N)	1.08	Nitrogen (N)	2.9	cations	K+	0.05
Phosphate(PO1)	0.01	Phosphate (P2O5)	0.02		Na+	11.4
Potassium (K)	22.4	Potash (K2O)	72.6		CA++	5.1
Magnesium (Mg)	85.6	Magnesium Oxide (MgO)	385.2		MG++	7.8
Calcium (Ca)	103.1	Calcium (Ca)	280.4			
Sulfate (SO1)	326	Sulfur (S)	283.4	anions	CL-	10.4
Manganses (Mn)	0.01	Manganese (Mn)	0.03		SO4--	8.7
Iron (Fe)	0.1	Iron (Fe)	0.27		HCO3-	6
Boron (B)	0.12	Boron (B)	1.1		CO3--	0.4

Total Cations	24.08
Total Anions	25.68

Exhibit 6: Water analysis of both sources done the year of the problem. Tests done by a university lab.

Date: 21-Aug-00
Results for: Dirk Burdick
Water samples received: 8/10/2000

USU #	ID	pH	"Salt" Electrical Conductivity	Sodium	Calcium+ Magnesium	Sulfate	Chloride	Carbonate+ Bicarbonate	Residual Carbonate	Boron
			umhos/cm			meq/L				mg/L
5727	Dry Creek (Main)	7.8	1650	8.28	8.03	4.59	7.21	4.28	0	0.33
5728	Tremble Creek (alt)	7.6	2200	9.42	14.3	9.93	5.73	6.46	0	0.42

SAR	Class	SAR adj.
4.13	C3-S1	9.54
3.53	C3-S1	9.46

Exhibit 7: University Lab soil test of a native soil green.

Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, UT 84322-4830
435-797-2217

Date received: 8/10/00
Date completed: 8/15/00

Name: Dirk Burdick

Lab number: 00011176
Identification: #9
Crop: Turf (sports)

Soil Test Results		Interpretations	Recommendations
Texture	Clay Loam		
Lime	++	Normal	
pH	7.7	Normal	
Salinity – ECe mmhos/cm	5.4		
Phosphorus – P ppm	3.4		3 lbs P2O5/1000 sq. ft.
Potassium – K ppm	270		0 lbs K2O/1000 sq. ft.
Nitrate-Nitrogen – N ppm			6-10 lbs N/1000sq ft/season

Exhibit 8: University Lab soil test of a sand green.

Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, UT 84322-4830
435-797-2217

Date received: 8/10/00
Date completed: 8/15/00

Name: Dirk Burdick

Lab number: 00011177
Identification: Practice Green
Crop: Turf (sports)

Soil Test Results		Interpretations	Recommendations
Texture	Sand		
Lime	++	Normal	
pH	8.1	Normal	
Salinity – ECe mmhos/cm	3.6		
Phosphorus – P ppm	5.2		3 lbs P2O5/1000 sq. ft.
Potassium – K ppm	63		3 lbs K2O/1000 sq. ft.
Nitrate-Nitrogen – N ppm			6-10 lbs N/1000sq ft/season