

FALL 2016

Data Collection Report
Soil & Water Consulting



— Est. 1947 —

Tucson Country Club



SOIL and WATER CONSULTING

Course Name: Tucson Country Club

Date of Visit: September 6, 2016

	<u>9/14/15</u>	<u>3/12/16</u>	<u>6/25/16</u>	<u>9/6/16</u>
Humidity/Air Temperature	52%/90°	46%/72°	22%/99°	20%/90°
Greens Temperature	75.7°	51.6°	78°	n/t
Fairway Temperature	75°	52.8°	78°	n/t

	Acceptable Range For Water Sample	Potable Lake <u>9/14/15</u>	Effluent Lake <u>9/14/15</u>	Potable Lake <u>3/12/16</u>	Effluent Lake <u>3/12/16</u>	Potable Lake <u>6/25/16</u>	Effluent Lake <u>6/25/16</u>	Effluent Lake <u>9/6/16</u>
EC	<2.25 mmhos/cm	0.40	0.46	0.39	0.44	0.40	0.13	0.46
Sodium		49.96	73.45	30.79	55.70	45.59	91.06	82.85
Calcium	20 - 60 ppm	25.38	14.50	34.87	25.08	32.28	47.90	17.75
Magnesium	10 - 25 ppm	2.29	3.48	2.80	1.76	2.00	7.27	1.06
Potassium	5 - 20 ppm	2.50	3.24	2.28	1.93	2.55	4.56	1.45
Nitrate	10 - 25 ppm	0.34	<0.10	n/t	1.15	n/t	1.62	1.70
Phosphorus	5 - 20 ppm	<0.20	0.22	n/t	<0.20	n/t	0.21	<0.20
Sulfur	30 - 90 ppm	42.51	49.59	39.69	35.88	35.16	87.81	23.87
Bicarbonate	<120 ppm	102.61	84.90	125.99	143.98	146.66	206.92	195.82
Boron	<0.67 ppm	0.10	0.13	0.06	0.11	0.08	0.19	0.15
Chloride	<177 ppm	32.00	40.68	22.30	30.98	21.62	61.10	16.00



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TEE	Acceptable Range For Alkaline Soils Sample	2 9/14/15	5 3/12/16	6 6/25/16	7 9/6/16
Organic Matter (Humus)	2 - 3%	2.13	2.92	2.60	2.17
Sulfur	12 - 16 ppm	27.00	18.00	30.00	34.00
Olsen - Phosphorus	13 - 20 ppm	13.00	14.00	13.00	9.00
Calcium - TEC of 6 - 12	1,000 lbs/acre	4,890.00	5,064.00	4,178.00	3,536.00
Magnesium	>7% base saturation or at least 200 lbs/acre	6.82%/250	7.13%/262	7.68%/242	6.79%/184
Potassium - TEC of 0 - 35	100 ppm	217.00	150.00	136.00	180.00
Copper	>0.8 ppm	1.05	0.95	1.20	1.37
Manganese	>1 ppm	3.00	2.00	3.00	2.00
Zinc	>1 - 2 ppm	3.79	4.71	5.30	4.63

FAIRWAY	Acceptable Range For Alkaline Soils Sample	2 9/14/15	5 3/12/16	6 6/25/16	7 9/6/16
Organic Matter (Humus)	2 - 3%	3.15	4.11	3.65	2.35
Sulfur	12 - 16 ppm	30.00	22.00	71.00	47.00
Olsen - Phosphorus	13 - 20 ppm	17.00	28.00	14.00	10.00
Calcium - TEC of 6 - 12	1,000 lbs/acre	4,364.00	3,462.00	5,012.00	3,364.00
Magnesium	>7% base saturation or at least 200 lbs/acre	8.26%/276	9.09%/246	8.62%/342	8.10%/214
Potassium - TEC of 0 - 35	100 ppm	225.00	213.00	371.00	245.00
Copper	>0.8 ppm	1.06	1.72	1.37	1.94
Manganese	>1 ppm	3.00	3.00	5.00	3.00
Zinc	>1 - 2 ppm	3.49	6.15	5.36	4.15

GREENS	Acceptable Range For Alkaline Soils Sample	2 9/14/15	5 3/12/16	6 6/25/16	7 9/6/16
Organic Matter (Humus)	2 - 3%	0.83	0.52	0.77	0.42
Sulfur	12 - 16 ppm	9.00	15.00	12.00	11.00
Olsen - Phosphorus	13 - 20 ppm	17.00	16.00	13.00	9.00
Calcium - TEC of 6 - 12	1,000 lbs/acre	1,908.00	2,492.00	2,502.00	2,090.00
Magnesium	>7% base saturation or at least 200 lbs/acre	7.94%/120	7.25%/148	6.76%/132	7.31%/126
Potassium - TEC of 0 - 35	150 ppm	217.00	384.00	278.00	353.00
Copper	>0.8 ppm	1.37	1.32	1.06	1.50
Manganese	4 ppm or more	2.00	1.00	2.00	2.00
Zinc	>1 - 2 ppm	4.81	3.18	3.20	2.98



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TEE	Acceptable Range For Saturated Paste Sample	6,15(avg) 6/25/16	7,16 (avg) 9/6/16
Nitrate - Ryegrass	5 - 10 ppm	3.50	
Nitrate - Bermudagrass	10 -15 ppm		35.00
Phosphorus	2 - 10 ppm	1.54	1.16
Potassium	40 - 100 ppm	18.86	70.39
Calcium	60 - 200 ppm	97.30	58.03
Magnesium	20 - 70 ppm	11.24	7.05
Sodium	0 - 30 ppm	162.19	111.62
Soluble Salts	<1,920 ppm	797.50	634.00
Bicarbonate	<60 ppm	224.52	172.05
Chloride	<1,000 ppm	112.00	83.00
SAR	<4%	4.22	3.70

FAIRWAY	Acceptable Range For Saturated Paste Sample	6,15(avg) 6/25/16	7,16 (avg) 9/6/16
Nitrate - Ryegrass	5 - 10 ppm	10.50	
Nitrate - Bermudagrass	10 -15 ppm		75.80
Phosphorus	2 - 10 ppm	2.16	2.25
Potassium	40 - 100 ppm	47.09	51.03
Calcium	60 - 200 ppm	87.64	87.50
Magnesium	20 - 70 ppm	12.76	13.07
Sodium	0 - 30 ppm	169.99	146.04
Soluble Salts	<1,920 ppm	891.50	986.00
Bicarbonate	<60 ppm	212.32	183.03
Chloride	<1,000 ppm	134.50	84.50
SAR	<4%	4.54	3.86

GREENS	Acceptable Range For Saturated Paste Sample	6,15(avg) 6/25/16	7,16 (avg) 9/6/16
Nitrate - Bentgrass	1-3 ppm	<1.4	18.45
Phosphorus	2 - 7 ppm	3.10	5.84
Potassium	25-40 ppm	22.19	73.13
Calcium	50- 75 ppm	24.55	17.18
Magnesium	15-30 ppm	3.02	2.68
Sodium	0 - 30 ppm	40.97	39.74
Soluble Salts	<1,000 ppm	260.00	452.50
Bicarbonate	<60 ppm	98.84	224.52
Chloride	<200 ppm	25.50	26.00
SAR	<4%	2.08	2.36



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TEE	Acceptable Range For Tissue Sample	7,16 (avg) 9/6/2016
Nitrogen	2.3%-5.0%	3.14
Phosphorus	0.15% - 0.50%	0.39
Potassium	1.0% - 4.0%	1.66
Calcium	0.35%-1.0%	0.50
Magnesium	0.13%-0.50%	0.14
Sulfur	0.15% - 0.50%	0.41
Boron	6-30 ppm	9.50
Iron	50-500 ppm	161.00
Manganese	25-300 ppm	28.15
Copper	5-50 ppm	15.90
Zinc	20-250 ppm	57.85
Aluminum	100-1150 ppm	124.00
Sodium	500-850 ppm	915.50

FAIRWAY	Acceptable Range For Tissue Sample	7,16 (avg) 9/6/2016
Nitrogen	2.3%-5.0%	3.03
Phosphorus	0.15% - 0.50%	0.46
Potassium	1.0% - 4.0%	1.97
Calcium	0.35%-1.0%	0.63
Magnesium	0.13%-0.50%	0.16
Sulfur	0.15% - 0.50%	0.51
Boron	6-30 ppm	11.15
Iron	50-500 ppm	272.50
Manganese	25-300 ppm	43.65
Copper	5-50 ppm	17.10
Zinc	20-250 ppm	54.40
Aluminum	100-1150 ppm	217.00
Sodium	500-850 ppm	1,200.00

GREENS	Acceptable Range For Tissue Sample	7,16 (avg) 9/6/2016
Nitrogen	3.0%-6.5%	3.84
Phosphorus	0.2%-0.55%	0.71
Potassium	0.86%-2.55%	2.47
Calcium	0.21%-0.50%	0.62
Magnesium	0.09%-0.22%	0.16
Sulfur	0.23%-0.39%	0.54
Boron	5-24 ppm	14.65
Iron	99-500 ppm	211.00
Manganese	30-160 ppm	90.25
Copper	9-40 ppm	25.75
Zinc	5-60 ppm	71.40
Aluminum	63- 408 ppm	119.00
Sodium	506- 2264 ppm	1,485.00



RECOMMENDATIONS



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Thoughts on the course visit

It was great to finally be there when it rained! Although it was the day after I sampled so these numbers would have changed a little after the rain. They mostly would have been lower in the areas that drain well like greens. The rain water at a pH of 6.56, reminds me of what would happen in Las Vegas after rain- you would get cleaned out of any salt build up, but would not really get that acidification that is seen in other areas of the country. I would like to get more rain water samples as time goes on to see if this is normal for you.

After seeing the course, I thought you made an excellent decision to let the ryegrass hang on longer in early Summer. Even applications of K-mag in June which helped the ryegrass to not die off so quickly. I learned something about your area by you doing that and by seeing how my new clients in Tucson struggle in the July-early August period.

When it rains there, the bermudagrass is going to thrive and take over the ryegrass no matter what you do! So, if the ryegrass can stay healthy until it begins to rain regularly, your transition should be fairly consistent. I would say, however, if you don't get the humidity and rain in the July/August time period, you could have some major issues with the ryegrass and transition to bermudagrass would be difficult. I think it is safe to say you will always have the "monsoon" season, it may not always be as good as you need it to be.

Continue to make Magnesium application a priority on the course. There is a long way to go before you would be overdoing it.



Notes from the visit

- Greens mowing height @ 0.160"
- Gypsum applied 2 weeks ago. Pro-Mag, 0-0-50 applied after sample collection that day.
- Fairway mowing height @ 0.600"
- 0.5 pounds of N per 1,000 sq. ft. applied recently (16-16-16)
- Overseeding with "Caddyshack 2" ryegrass at 800 pounds per acre.
- Reducing areas of the course overseeded from 75 acres to 55 acres is the goal.
- Using 328 bermudagrass to sod rough.

Fertilizer and Product Recommendations

Tees & Fairways (Prior to Winter)

Phosphorus- 100 pounds of product per acre. (11-55-00)

Magnesium/Potassium-400 pounds of product per acre.(0-0-22; K-Mag)

Greens (Monthly applications)

Calcium- 10 pounds of product per 1,000 square feet. (Gypsum)

Magnesium- 3 pounds of product per 1,000 square feet. (Pro-mag)

Potassium- 2 pounds of product per 1,000 square feet (0-0-50)

Manganese- 2 pounds of product per 1,000 square feet . (Tech-Magnum) **WATER IN!!!**

*** Synthetic acid spray and water in every two weeks**