



Miller's Miscellaneous

Well, it is now spring time for most of us, and VERDE-CAL use is in full swing. This is a perfect time to wake things up in the soil and continue to strengthen your turf and ornamentals. Check for some handy links in the margins to access quick PDF's and our web site.

Water quality and sodium and related salts are still a hot topic. We have several products to help with this very difficult

agronomic issue. In an effort to keep our readers and customers up to date, I am including the latest Field Case Study. This study was done independently in Canada at two very prominent Canadian Golf Courses. Read this article to see and understand how to use two great products together for success in dealing with tough water and soil situations.

And to finish off this newsletter,

we have two products highlighted that can assist your needs for:

1. Flushing
2. Remediation of salts/sodium
3. Create nutrient release

Look for the links in the margins for AcidipHY and VERDE-CAL G.

Enjoy the newsletter and please pass it along to your customers and friends.



AcidipHy: Unique Product.

AcidipHy has been in production for about four years. There are very good case studies in the US to show its performance. AcidipHy is a Granular Soil Acid Treatment. Designed to provide "Volumetric Slow Release" of acidification and nutrient release by the release of calcium and other available nutrients, all of which help stabilize and condition the soil solution.

Granular application is important!

Why?

Because difficult to treat levels of bicarbonate and salts require volume. With AcidipHy, higher rates can be achieved simply by spreading more product. By doing this, incredible change (through volumetric release of acidification) can be accomplished in the soil profile and conditioning of the soil solution is provided quicker and will have some lasting effects.

How long?

In many cases as long as two months, and in some cases it has been longer. All soils and water

are different.

Because of the differences, acidification acts differently as well... So it is extremely important to have the following information prior to properly diagnosing the severity of bicarbonate, sodium and the fate of other key cations in the soil and solution.

1. Thorough soil test
2. Proper Saturated Paste Test
3. Thorough water quality test.
4. Our EC/SAR Interpretation Guide

Once you have all four pieces of information, it will be possible to determine exactly how you need to proceed in treatment of both the soil and soil solution when dealing with poor water quality and tough soil issues.

I urge you to keep these guides close to or in your soil test files for future reference. You may access these guides by clicking on the links in the margin of this article.

Special Interest Articles:

- Miller's Miscellaneous.
- AcidipHy: Unique Product
- Canada Case Study: Dealing With Difficult Soil and Water Issues
- AcidipHy and VERDE-CAL G: Canada Case Study
 - Site #1
 - Site #2
- VERDE-CAL G Vs. Gypsum

Go to http://www.verde-cal.com/west/pdf/Acid_Substitutes.pdf for a great article on **Acid Substitutes and pH Reduction.**

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Canada Case Study: Dealing with difficult soil and water issues.

Go to http://www.verde-cal.com/west/pdf/AcidipHy_lit.pdf to download AcidipHy literature.

"There is not a sprig of grass that shoots uninteresting to me."
Thomas Jefferson

For us American's... when we think of Canada, for me at least, I still think of pristine lakes, great hunting and fishing. Until I started to travel there all those things were what I always thought of first. Now, having been to Ontario and seeing the golf business from the agronomy side... I realize that Canadian Golf Course Superintendents are dealing with some of the most difficult soil and water issues you will find in North America! Much to my

surprise, these superintendents are incredibly well trained on the issues of poor water quality and difficult soil conditions. Their weather can be just as dry and "droughty" as anywhere else. They can also have seasons of very hard to control rainfall. I still see Canada as a beautiful place and incredible country, but now I better understand what golf courses and lawncare/sports turf are dealing with day to day! It can be very difficult to grow good turf and the season

is short. The pressure is on for success more than ever.

Our Canadian Case Studies were done at two very prominent Golf Clubs in the Toronto area. We call them Site 1 and Site 2. As you will see from the results highlighted in the study, we had great success controlling bicarbonate and sodium utilizing two very strong products: VERDE-CAL G and AcidipHy. First a quick explanation of the products.

**AcidipHy and VERDE-CAL G: Canada Case Study.**

2012 was a difficult season for the Toronto, Canada region. Though there was rainfall, it was a feast or famine pattern and temperatures only added to the struggles for area superintendents to provide good playing conditions. Here is a summary of the rainfall and temperatures for the Toronto area as they pertain to the testing period.

The program prescribed and used by both sites below was to alternate AcidipHy and VERDE-CAL G use through the growing season. AcidipHy was used to create acidity safely. This also allowed nutrients to release which helped buffer the soil solution. The VERDE-CAL G was used alternately with the AcidipHy to flush and continue to buffer the soil base cations.

It is important to know that there is a strong need for water treatment, but the amending and solution conditioning story

ends in the soil profile... not the irrigation water! While additional irrigation is being applied, there must be enough buffering in the soil to allow longevity of the treatments. This is very important. This key factor is also where other type products fall short. Many liquid acid applied products simply cannot address the volume of release needed in the soil and soil solution to give any long term benefits (see USGA link in margin). Because of this, our program of alternating two very strong conditioning products gives the turf manager greater advantage to address the real issues in the soil and water: Bicarbonate, sodium, SAR, EC, Carbonate and also provides for longevity of the treatment.

Go to <http://www.verde-cal.com/west/pdf/testing-brochure.pdf> for more Soil and Water Interpretation charts.

"Knowing trees, I understand the meaning of patience. Knowing grass, I can understand persistence."

Hal Borland

2012 Tough Season...**Weather summary: Site 1 and 2**

June average low:	14.5 c (58 f)	average high (noon):	26.6 c (79 f)
July average low:	18.7 c (66 f)	average high (noon):	29.6 c (85 f)
Sept. average low:	11.6 c (53 f)	average high (noon):	21.3 c (70 f)

Precipitation summary: Site 1 and 2

June rainfall	75 mm (3.0")
July rainfall	40 mm (1.6")
Sept. rainfall	117 mm (4.7")

Water quality: Site 1 and 2

Site 1: Issues - Bicarbonates, EC, Sodium, and SAR.
Site 2: Issues - Bicarbonates, EC, Sodium, SAR, and pH

Summarize: Rainfall was down and water issues were up. There is a need to treat the soil solution and go after the negative problems causing problems with: Fertility, stress, etc...

Canada Case Study cont.: Site #1

The following case studies show the upper 2 inches and the lower 4 inches of soil profile testing. Dates are shown as well. The Sept. 11th "lower 4 inch" sample may be a glitch with testing as the calcium base saturation dropped dramatically. We were not able to clarify this, but assume it could be a

testing glitch since it was very inconsistent with the other tests done prior. Regardless, the program produced great conditioning in the soil of tied up cations. This end result was noticed on paper as well as visually. Changes are highlighted near the bottom of the test.

Acidiphy Work 2012 Growing Season

Testing site #1 Toronto Area, Ontario, Canada

Test Code(units)	Top 2" Root Zone				Lower 4" Root Zone				Optimal Range
	Green 12		Green 11		Green 12		Green 11		
	Jun-29	Sep-11	Jun-29	Sep-11	Jun-29	Sep-11	Jun-29	Sep-11	
pH	7.0	7.3	6.9	7.3	7.1	7.7	7.2	7.6	6.0 - 7.2
Buffer pH	7.4	0	7.4	0	7.5	0	7.5	0	
OM%	1.7	4.6	1.8	2.1	0.5	0.6	0.5	0.6	1.5-3.0
Phosphorous(ppm)	24	30	30	33	14	16	13	16	15.0-20.0
Potassium(ppm)	102	92	105	106	75	64	68	754	75.0-150.0
Calcium(ppm)	564	882	665	595	327	342	341	346	1200.0-1800.0
Magnesium(ppm)	92	138	89	93	51	63	47	56	180.0-270.0
Sodium(ppm)	27.4	47.3	23	39.7	11.5	18.3	10.6	15.3	0.0-150.0
Sulfur(ppm)	22.14	33.29	29.09	45.48	14	16.53	10.87	17.74	12.0-18.0
Zinc(ppm)	16.03	18.67	19.53	17.49	3.39	3.26	4.58	2.87	2.0-5.0
Manganese(ppm)	23.4	26	23.6	25.6	7.9	5	10.4	6.6	>15.0
Boron(ppm)	0.33	0.34	0.33	0.29	0.18	0.12	0.2	0.1	0.6-1.2
Copper(ppm)	0.5	0.6	0.6	0.6	0.3	0.4	0.3	0.3	1.0-2.5
Iron(ppm)	14.1	15.02	19.9	17.41	11.7	8.77	11.1	8.89	12.0-18.0
CEC(meq/100g)	4.5	6	4.7	4.2	2.3	2.4	2.3	4.2	4.0-8.0
K Base Sat %	5.8	4	5.7	6.5	8.3	6.6	7.6	4.6	2.0-5.0
Mg Base Sat %	17	19.2	15.7	18.4	18.4	21.1	16.8	11.2	12.0-18.0
Ca Base Sat %	62.3	73.4	70.5	71	71.1	69	73.7	41.2	60.0-80.0
Na Base Sat %	3	3.4	2	4.1	2	3.2	2	1.6	0.0-5.0
H Base Sat %	3	3.4	5.9	0	0	0	0	0	10.0-15.0
K:Mg Ratio	0.3	0.2	0.4	0.4	0.5	0.3	0.5	4.1	0.2-0.5
Ca:Mg Ratio	3.7	3.8	4.5	3.9	3.9	3.3	4.4	3.7	4.0-8.0
Estimated N Release (lbs/acre)	16.5	46.2	17.6	20.8	4.9	6.3	4.9	6.2	
Soluble Salts (mS/cm)	0.3	0.2	0.3	0.3	0.1	0.1	0.1	0.1	0.0-1.0
Bi Carb from Paste Test (ppm)	120	92	111	79	121	80	117	81	

"The turf quality was noticeably better than the year before."

Test Site Superintendent comment

Go to http://www.verde-cal.com/west/pdf/EC-SAR_Chart.pdf to see the relationship between water salinity and sodium absorption.

Test Site #1 Results

K levels: Adjusted an average of 23% to the good range.

Ca levels: Remained better balanced.

Green 11, Sept. test ???

Na levels: Fluctuated up and down, but is expected with water issues. **None-the-less, Na remained greatly under control in a very difficult year.**

Bicarb: Remained safe in upper 2", and very safe in lower 4".

All in all, the adjustment of Ca indicates soil flocculation and nutrient interaction and release. This is noted by the Bicarb reduction.

Canada Case Study cont.: Site #2

“And I’d like to give my love to everybody, and let them know that the grass may look greener on the other side, but believe me, it’s just as hard to cut.”

Little Richard

Summarizing Site two: many similarities to site one. However, here we created more exchangeable Ca which had a drastic effect on potash. Potash levels adjusted 54% to the more balanced side. Sodium was well controlled and Bicarb dropped to a safe level.

It was very interesting to see the very high magnesium levels come down to very well balanced levels. Many turf managers that see this, realize that the nutrients are there, but they were unable to utilize them in the past. Only two products on the market today are capable to reduce high

magnesium levels. VERDE-CAL G is labeled and AcidipHy certainly can do it as well. Magnesium is a tough cation to reduce because of its dominance in the soil.

Site two resulted in better turf and better soil tests.

Test Site #2 Results

K levels: Adjusted an average 54% toward balance.

Mg levels: Adjusted an average of 42% toward balance.

Na levels: Remained safe and at good levels

Bicarb: Remained in a safe range.

Soluble salts: Stayed safe as well.

“The first to lose control... Loses!”
Cary Stofel

Acidiphy Work 2012 Growing Season

Testing site #2, Toronto area. Ontario, Canada

Test Code(units)	Top 2" Root Zone				Lower 4" Root Zone				Optimal Range
	Green 8		Green 17		Green 8		Green 17		
	Jun-29	Sep-20	Jun-29	Sep-20	Jun-29	Sep-20	Jun-29	Sep-20	
pH	7.0	7.4	7.2	7.5	7.3	7.8	7.4	7.8	6.0 - 7.2
Buffer pH	7.5	7.5	7.5	7.5	7.5	0	7.5	0	
OM%	1.2	4.1	1.3	5.5	0.7	7.3	0.7	7.3	1.5-3.0
Phosphorous(ppm)	30	49	29	34	19	22	14	17	15.0-20.0
Potassium(ppm)	115	70	149	55	80	51	81	64	75.0-150.0
Calcium(ppm)	416	755	459	658	364	536	301	519	1200.0-1800.0
Magnesium(ppm)	118	84	133	68	76	66	67	65	180.0-270.0
Sodium(ppm)	19.8	22.3	25	19.6	13.2	18	13	25.7	0.0-150.0
Sulfur(ppm)	37.12	30.23	42.35	17.38	19.55	11.99	21.11	12.58	12.0-18.0
Zinc(ppm)	14.68	15.5	17.98	18.71	3.96	5.51	3.56	6.91	2.0-5.0
Manganese(ppm)	9.9	16.3	11.8	14.1	3.5	6	2	4.6	>15.0
Boron(ppm)	0.33	0.37	0.5	0.35	0.26	0.26	0.35	0.31	0.6-1.2
Copper(ppm)	1	1.1	1.1	1.6	0.6	1.2	0.8	1.3	1.0-2.5
Iron(ppm)	15.2	21.42	16	15.51	11.5	9.56	8.8	8.89	12.0-18.0
CEC(meq/100g)	3.4	4.8	3.9	4.1	2.7	3.4	2.3	3.4	4.0-8.0
K Base Sat %	8.5	3.8	9.8	3.4	7.6	3.8	8.9	4.8	2.0-5.0
Mg Base Sat %	28.6	14.7	28.4	13.9	23.2	15.9	24	16	12.0-18.0
Ca Base Sat %	60.4	79.5	59	80.6	67.1	78	64.7	76	60.0-80.0
Na Base Sat %	2	2	3	2.1	2	2.3	2	3.3	0.0-5.0
H Base Sat %	0	0	0	0	0	0	0	0	10.0-15.0
K:Mg Ratio	0.3	0.3	0.3	0.3	0.3	0.2	0.4	0.3	0.2-0.5
Ca:Mg Ratio	2.1	5.4	2.1	5.8	2.9	4.9	2.7	4.8	4.0-8.0
Estimated N Release (lbs/acre)	11.7	40.5	12.5	54.5	7.3	73	6.9	73	
Soluble Salts (mS/cm)	0.3	0.2	0.3	0.1	0.2	0.1	0.1	0.1	0.0-1.0
Bi Carb from Paste Test (ppm)	157	143	169	126	160	133	165	149	

Many superintendents that experience similar results as site #2 will tell you...

“I have been walking on my money all along. Now I see the release and can understand how to better address the problems I have had.”

VERDE-CAL vs. Gypsum:

Product Comparison Sheet

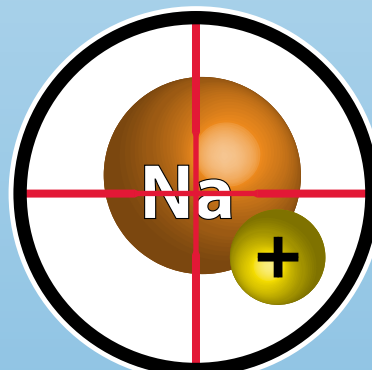
Selling Point	Gypsum	VERDE-CAL G
Percent Calcium in Product	18% Calcium	22% Calcium
Amount needed to: Exchange Sodium Exchange Magnesium Treat hi pH Treat tight soils Treat effluent water in soil	2000 lb + per acre – Curative 1000 lb per acre – Maintenance	435 lb per acre – Curative 220 lb per acre – Maintenance
Available calcium per application	You get about one third of the calcium released per year	100% available calcium
Incorporation requirements	Must be incorporated 6 to 7"	No incorporation needed
Other benefits		thCa™ organic acid Contains penetrant 1:4 use ratio vs. lime
Amount of Ca needed to: Exchange sodium Exchange Magnesium Treat high pH Treat tight soils Treat effluent water in soil	90 lb / acre of soluble Ca. Since product is 1/3 available per year, adjustment is very minimal or can't change at all.	90 lb / acre of soluble Ca. VERDE-CAL G delivers at least 100 lb Ca per acre from one application. Exchange and reaction is significant.
Benefits to fertility		VERDE-CAL G will benefit other fertility treatments by conditioning the soil and releasing nutrients already there.
Budget strategy for VERDE-CAL G: High Na and/or Mg, Effluent conditions, Tight soil	Average coarse price/acre: **\$8.00 in 50 lb bag (pelleted) Or \$320.00 per acre	Average selling price: VERDE-CAL G Coarse: \$23.00 per bag; or \$207.00 per acre
Budget strategy for VERDE-CAL G:	Average price per acre: \$160.00 per acre.	Average price per acre: \$115.00 per acre.

**Coarse Gypsum - \$8.00 per bag (50#)
Greens grade would be slightly higher in price.
Prices given are only estimated.

In all cases VERDE-CAL G is the better option. Save on labor, waste, application time, no incorporation, dissolves quickly.

For more information about VERDE-CAL G, go to <http://www.verde-cal.com/east/pdf/verde-cal-g-east.pdf>

VERDE-CAL G
Make Sodium "THE MARK"



*My father used to play with my brother and me in the yard. Mother would come out and say, "You're tearing up the grass," Dad would reply. "We're raising boys, not grass."
Harmon Kilabrew*

**FEED THE SOIL AND THE SOIL
WILL FEED THE PLANT.**

If you need more literature, please request some to be mailed to you by contacting the following:

maryanne@aquaaid.com
scott@aquaaid.com

Specify how much you need and where to mail it to.