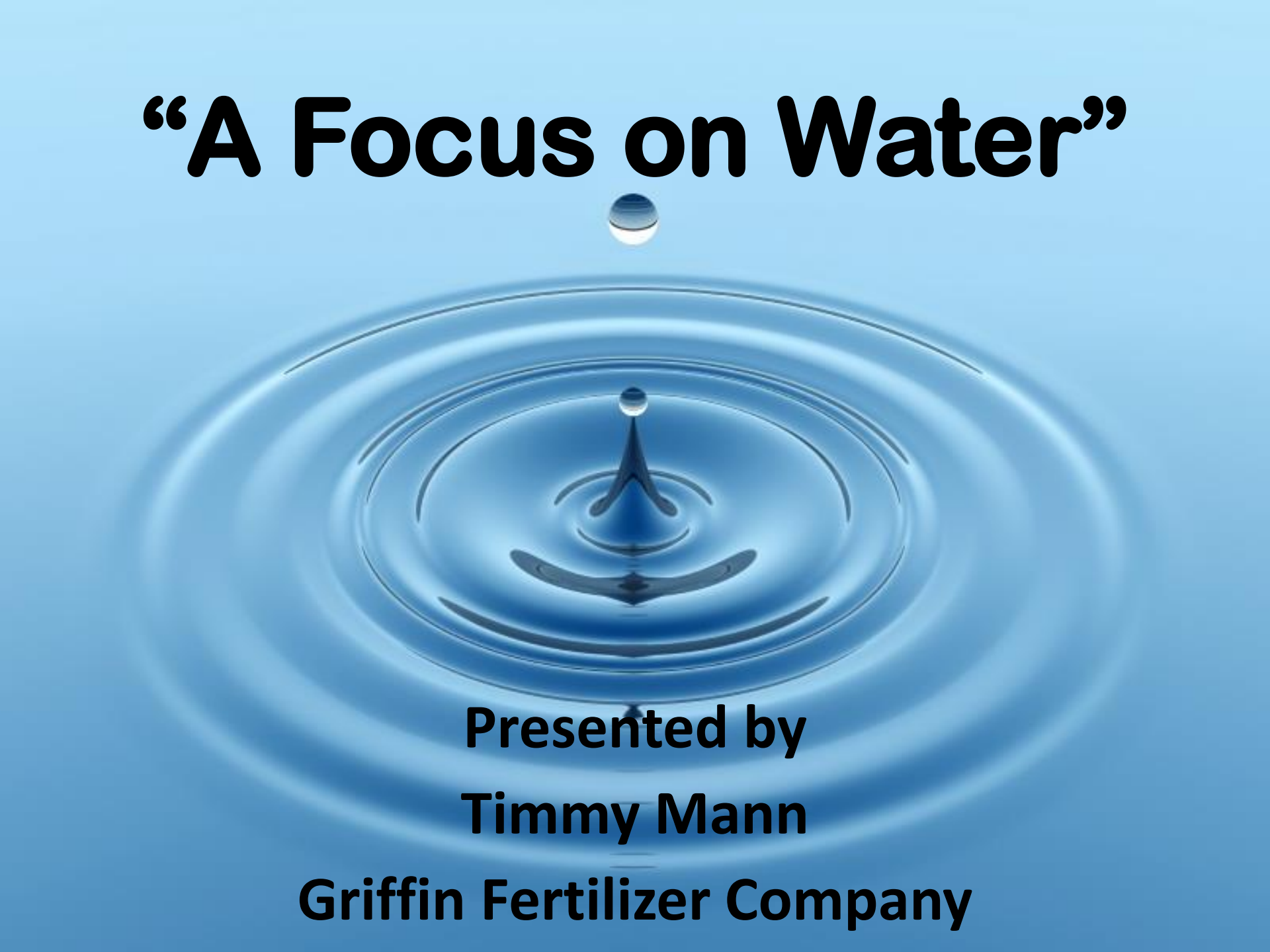
“A Focus on Water”



Presented by

Timmy Mann

Griffin Fertilizer Company

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Why is Water Quality Important?

Natural AG Solutions, LLC

Irrigation Water Quality Analysis

GROWER: Joe Grower SAMPLE ID: Grove #1					Nutrients Applied Per Acre, Based on 12.00 Inches of Irrigation Water
	ppm		*P as P2O5, K as K2O*	*P as P2O5, K as K2O*	*P as P2O5, K as K2O*
Reported Results	**On Report**	**Rating**	**Pounds per 10,000 Gallons Water**	**Pounds per Inch of Irrigation**	**12.00**
Nitrate Nitrogen	0.10	Normal	0.01	0.02	0.27
Phosphorus	0.04	Normal	0.01	0.02	0.25
Potassium	2.00	Normal	0.20	0.54	6.53
Calcium	61.07	Excessive	5.10	13.84	166.06
Magnesium	26.30	High	2.19	5.96	71.52
Sodium	21.06	Normal	1.76	4.77	57.27
Chloride	43.00	Normal	3.59	9.74	116.93
Sulfate	122.00	High	10.18	27.65	331.74
Boron	0.04	Normal	0.00	0.01	0.11
Carbonate	0.00	Normal	0.00	0.00	0.00
BiCarbonate	236.68	Excessive	19.75	53.63	643.58
pH	7.70	Normal			
Conductivity (dS/m)	0.616	Normal			
Total Dissolved Solids	*394.24*	Normal	32.90	89.33	1072.02
Langelier Saturation Index	*0.23*	High			
Alkalinity (ppm CaCO3)	*194.00*	Excessive	16.19	43.96	527.53
Adjusted Sodium Adsorption Ratio (RNa)	*0.66*	Normal			
Residual Sodium Carbonate (RSC)	*0.74*	Normal			

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Treatments for Bicarbonate Issues

- ✓ Bicarbonate Ratings
  - ✓ >90 ppm is HIGH
  - ✓ 180 ppm is EXCESSIVE
- ✓ Use Foliar Applications of Biostimulants, such as Crop-Set®, to increase the Production of Antioxidants, Lessening the Effects of Free Radicals Caused by Bicarbonate Uptake into the Plant.
- ✓ Use Acids to Reduce the Bicarbonate Levels.
- ✓ Acids Can Easily be Added in Liquid Fertilizer Blends.
- ✓ Acids Can Be Added Proportionally Or in SLUGS

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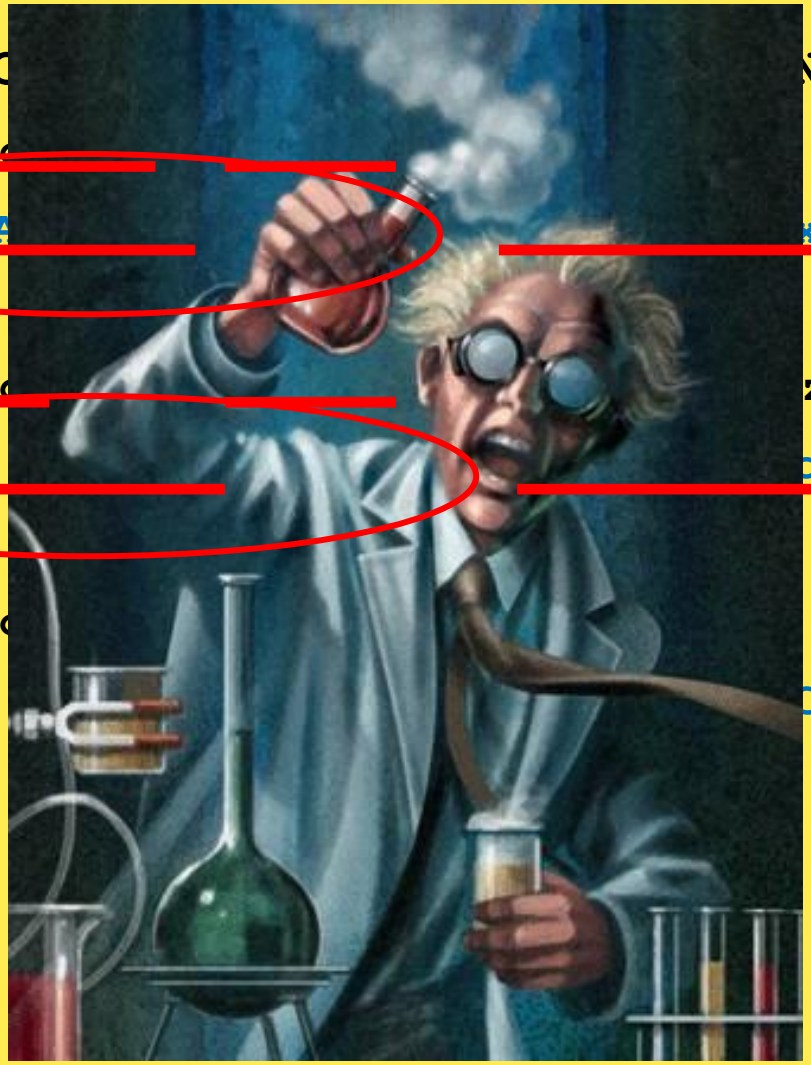
The Chemistry Behind Acid Treatments



AC NS

Baking Soda (S (Acetic Acid)

Sodium A xide

Calcium Bicarb zer)

Calcium oxide

Calcium Bicarb

Calcium Carbon Dioxide

Urea Sulfate "N-pHuric®, N-pHix®"

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Rule of Thumb…

16 oz of N-pHuric® per 1000 gallons of Irrigation Water will remove 115 ppm of Bicarbonates

Assume a Situation with 300 ppm Bicarbonates, and a Target of 90 ppm.

300 ppm – 90 ppm = 210 ppm Bicarbonate to be removed

210 / 115 * 16 = **29 oz per 1000 gallons** of Irrigation Water

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N-pHuric®

Problems with N-pHuric®…

It Can Be Expensive. $369 Per Acre on the Previous Example (12 acre inches, Reduced Bicarbs from 300 to 90; ie 29 oz per 1000 gallons)

Supplies a LOT of Sulfur: 150 Lbs per Acre

Supplies a LOT of Nitrogen: 141 Lbs per Acre

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N-pHuric® Alternatives

Sulfuric Acid

Phosphoric Acid

Nitric Acid

…

Liquid Fertilizer Blended With These Acids

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N-pHuric® Alternatives

NATURAL AG SOLUTIONS **January 5, 2015**

FERTILIZER BLEND FOR N-pHuric®

1.00 TONS - Approximately 159 gallons
GRADE: 15-0-0 16.00S

Material	Lbs/Ton
Urea Sulfate	2,000.0
Total	2,000.0

1

Salt Out Temp: 32 degrees F 1

Weight: 12.6 pounds per gallon 1

Acid Treatment (100 ppm BiCarb): 13.8 Oz/1000 1

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N-pHuric® Alternatives

NATURAL AG SOLUTIONS **January 5, 2015**

FERTILIZER BLEND FOR 9-4-9 with Phosphoric Acid

1.00 TONS - Approximately 195 gallons

GRADE: 9-4-9 0.02S 0.002B 0.040FE 0.040MN 0.000MO 0.040ZN

Material	Lbs/Ton
Iron EDTA	26.7
Phosphoric Acid	131.6
Muriate of Potash	292.7
MZ5 Micronutrients	16.0
Urea Ammonium Nitrate	560.0
Hot Base	973.1
Total	2,000.0

Salt Out Temp: 52 degrees F

Weight: 10.3 pounds per gallon

Acid Treatment (100 ppm BiCarb): 304.7 Oz/1000

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N-pHuric® Alternatives

NATURAL AG SOLUTIONS January 5, 2015

FERTILIZER BLEND FOR 9-0-9 WITH ONE GALLON OF N-PHURIC®

1.00 TONS - Approximately 201 gallons

GRADE: 9-0-9 0.12S 0.002B 0.040FE 0.040MN 0.000MO 0.040ZN

Material	Lbs/Ton
Iron EDTA	26.7
Muriate of Potash	292.7
MZ5 Micronutrients	16.0
Urea Ammonium Nitrate	554.1
Urea Sulfate	12.6
Hot Base	1,098.0
Total	2,000.0

Salt Out Temp: 52 degrees F

Weight: 10.0 pounds per gallon

Acid Treatment (100 ppm BiCarb): 2,763.3 Oz/1000

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N-pHuric® Alternatives

NATURAL AG SOLUTIONS January 5, 2015

FERTILIZER BLEND FOR 6-2-6 with Nitric & Phosphoric Acids

1.00 TONS - Approximately 199 gallons

GRADE: 6-2-6 0.02S 0.002B 0.040FE 0.040MN 0.000MO 0.040ZN

Material	Lbs/Ton
Ammonium Nitrate	111.1
Iron EDTA	26.7
Phosphoric Acid	65.8
Potassium Nitrate	260.9
MZ5 Micronutrients	16.0
Nitric Acid	500.0
Hot Base	1,019.6
Total	2,000.0

Salt Out Temp: 52 degrees F

Weight: 10.0 pounds per gallon

Acid Treatment (100 ppm BiCarb): 72.2 Oz/1000

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A Focus on WATER

Water Quality IS Important!

Know Your Water.

Bicarbonates Are a Very Real Issue.

Custom Liquid Fertilizers Offer the Most Economical and the Most Effective Tool for Neutralizing Bicarbonates.