



The Do's and Dont's of WaterSOLV™ Solutions

May, 2020 – Ver. 1.0

This document is managed in our continuous improvement program. The most recent version can be found online at our website under either Turf Tools or Ag Tools. Please consult the formal technical data sheets for complete advisory statements, rules and requirements.

CONTENTS

Treatment Rates 3

The Culprits 3

PRIOR TO TREATMENT 4

Handling 4

Organic 6

Registration and Requirements 6

Pckaging, gallons 7

Testing 7

Timing 7

Topical Treatment 7

Why Chemical Injection 7

pH values? 8

The Value of Infiltration 10

Negative Effects of Biology 10

Bacteria are Chronic Issues across market segments 11

<p>Product Operation</p> <p style="text-align: center;">CEMENTATION IS JUST BOUND UP NUTRITION</p>	<p>HCT WaterSOLV™ - Convert low water hardness and nutrition to non-scale forming high-grade nutrition. Significant mitigation of sodium including sodium-calcium and ferric chloride. Primarily used where hardness is low and sodium is high - <u>Low water hardness & sodium</u>.</p> <p>WaterSOLV™ Curative – Similar to HCT WaterSOLV™ but used where there is <u>high water and soil hardness and moderate water sodium</u>.</p> <p>WaterSOLV™ BC – When bacteria are significant in water and food sources are present in water and soils; colonies, slimes and hindered infiltration of soils usually occur. Peroxide for the bacteria, with HCT WaterSOLV™ Curative, we form a peracetic acid cleaner, where the degradation product of the peroxide is dissolved oxygen and water, aiding in the development of aerobic soil conditions and crop vitality.</p> <p>Summation: Sustainable, continuous aerification, high-grade hydratable nutrients, the addition of amino acids and glycolate sugars, sodium and chloride mitigation.</p>
<p>TREATMENT RATES</p> <p>Treatment is for Water Curation is for Drip Lines & Soils</p> <p>See our online tools.</p> <p>WaterSOLV™ Analysis Form Water, Soil & Tissue WaterSOLV™ Quick Calc Treatment rates and use cost Splash Blends Pump Settings</p>	<p>HCT WaterSOLV™ is used uniquely. Contact HCT for assistance. <i>Where sulfurous acid is used, it is applied at 10% of the acid volume to alleviate to formation of mineral crystals and to form higher grade mineral nutrients. We don't like sulfuric due to safety, overloading of sulfur and nitrogen.</i></p> <p>WaterSOLV™ Curative is used to treat and cure Calcium Carbonate, Magnesium Carbonate and Bicarbonate. Therefore, (total hardness + total bicarbonate) / 200 = ppm product for water treatment. Soil curation rates may be 2 to 10X the amount depending on how bad the soil is and how quick results are desired. We have seen 10X cases on turf without any vegetation cell damage at 75 ppm and more.</p> <p>WaterSOLV™ BC is linear to bacteria and peroxide. We use a formula (Total Bacteria exponent x 0.25) = ppm WaterSOLV™ BC. Keep in mind this operates like peroxide on bacteria, like an oxidizer on slimes, like HCT WaterSOLV™ for water hardness, and sodium and it degrades to dissolved oxygen for continuous chemical aerification. We've tested at 60 ppm and no yellowing or cell damage.</p>
<p>THE CULPRITS</p> <p>PLANTS ARE WHAT THEY CAN DRINK SODIUM (MINERAL) AND ZINC (METAL), ARE RTHE MOST SOLUBLE WHEN HYDRATED, AND EVEN AFTER CRYSTALIZING AND RE-HYDRATED.</p>	<p>Know the culprits, understand the symptoms, change <u>your</u> world!</p> <ol style="list-style-type: none"> 1. Hardness is nutrition, Ca, Mg, P, K. Don't we always hear about calcium and magnesium carbonate, calcium phosphate. All of these in the soluble form, not precipitated, sum up to represent TDS and also EC. What causes them to go from soluble to precipitate / scale / cementation is their absorption of carbon dioxide, carbonates, the very bubbles you see in a glass when dissolving scale or etching concrete. Without the gas breaking off, the scale remains intact. By disassociating the cation from the bicarbonate (anion), you create minerals in solution, drinkable by plants. The disassociation is commonly caused by adding acid to the alkali, and the reaction is usually measured by pH. As the reaction occurs the pH will rise but only to about 30,000 TDS which is where saturation occurs.

	<p>Every time HARD water in the air lands on the ground, as it releases the H₂O, the minerals will concentrate, absorb carbon dioxide and form insoluble scale. (See image below)</p> <p>Continue this with sulfurous acids and insoluble scale crystals will form, along with saturating the soils with N, S and insoluble oxalates. You'll observe these with black layer, anoxic conditions, root rot, puddling, slosh and poor infiltration. All of this can lead to colonies of bacteria, slime, H₂S, sodium-calcium and ferric chloride - toxicity.</p> <ol style="list-style-type: none"> 2. Sodium, the most soluble mineral, zinc the most soluble metals. If complexing in the soil, infiltration is problematic. Then you ask; is it cementation, biology / slime, sodium/chloride, or a matrix? Sodium and zinc become the most readily available elements with water and rain. This needs to be fixed readily. Just because sodium and chloride may be high, the key is are they building up in the soil in comparison to the source water. 3. Bacteria + Food source + Water = problems – Colonies of bacteria, toxic wastes, slimes. Mitigate the one organism in the water, you need not mitigate the colonies it likely would have formed in the soil along with the slime barriers and toxic wastes.
<p>PRIOR TO TREATMENT</p> <p>PROGNOSIS WITHOUT DIAGNOSIS IS MALPRACTICE</p>	<ol style="list-style-type: none"> A. N – If N of any form is greater than 20 ppm in the soil, you do NOT want to acidify the soil, yet. Use the WaterSOLV™ BC until the N levels are below 20 ppm. The reason for this is if the N is acidified it will tend to block oxygen flow. B. Na, Cl – if Sodium and or chloride are significant in the soil, then 2-4 times the treatment and over watering for the first 2-3 watering's is important. We need to add sufficient water and chemistry to generate the reactions with sodium, calcium and ferric chloride.
<p>HANDLING</p>	<p>HCT WaterSOLV™ - Like a vinegar syrup. No special handling or storage requirements. Shelf life is indefinite. Neutralize with alkali. Safe for disposal to sewers, waterways and topical soil treatment provided diluted and the safety of aquatic species are pre-determined.</p> <p style="text-align: center;">HAZARDOUS</p> <p>WaterSOLV™ Curative –JUST LIKE SWIMMING POOL ACID BUT SAFER TO HUMAN CONTACT AND LESS CORROSIVE – <i>Extremely fume like opening a container of pool acid. The fumes, vapors and condensate are corrosive. Product must be stored with adequate, environmental, non-mechanical ventilation, or contain a fume scrubber (www.hctllc.com).</i></p> <p>Neutralize with sodium bicarbonate (baking soda) – 1 lb. per gallon of Curative. Diluted adequately in water product is beneficial for lakes, streams, ponds, soils and vegetation. Product is also approved for use in treating water for agriculture. In case of contact, flush with water.</p>

**HAZARDOUS
DANGEROUS**

WaterSOLV™ BC – Peroxide based, 34% active, 90% vol, hydrogen peroxide. May be diluted with water to lower exposure risk.

DANGEROUS to eye contact. Properly stored the shelf life is indefinite.

1. MUST BE CERTIFIED TO SELL AND TO USE.
2. THIS LIQUID CAN BE VOLATILE.
3. THE LIQUID CAN CAUSE AT FIRE AT THIS CONCENTRATION
4. ALWAYS STORE UPRIGHT
5. NEVER MIX CURATIVE OR BC WITHOUT AT LEAST 50% WATER
6. BC MUST BE KEPT SHADED AND COOL
7. IF BC GETS REACTIVE, COOL WITH WATER MISTING
8. MUST NOT ALLOW PRODUCTS TO LEAK INTO THE OTHER, EVEN ACCIDENTLly, THEY NEED TO DRAIN AWAY FROM EACH OTHER.
9. CRITICAL – ADEQUATE WATER VOLUME AND PRESSURE IS REAFDILY AVAILABLE IN CASE OF REACTION OR TOTAL PRODUCT LOSS. 40 PSI MINIMUM, 40 GPM, 10 TIMES THE PRODUCT VOLUME. WITHOUT DILUTION CAN REACT WITH MATTER IN SEWERS AND DRAINS. MUST DILUTE 10-FOLD.

<p>ORGANIC</p>	<p>Are HCT WaterSOLV™ Products registered organic? NO. Are sulfurous acids organic? No. Are sulfurous acids allowed for use by organic regulators? Yes. So why not certify them as organic? Because they aren't. Then why not authorize them under the organic program?</p> <p>A. Because they aren't organic B. Because it is outside the scope of organic nutrition, it is water treatment, not nutrition, not pesticide.</p> <p>Like the California Department of Food and Agriculture (CDFA) and other Departments of Agriculture, they regulate nutrients and pesticides. While most states do not have registration requirements for water treatment, CDFA does; in Auxiliary Soil and Water Substance (ASPS). It is a non-reportable category; in other words, the amount of sales does not require reporting. OMRI stated in written communication, the use of water treatment additives is at the discretion of the individual inspector.</p>
<p>REGISTRATION AND REQUIREMENTS</p>	<p>California Department of Food and Agriculture (CDFA) and other Departments of Agriculture, regulate nutrients and pesticides. While most states do not have registration requirements for water treatment, CDFA does; Auxiliary Soil and Water Substance (ASPS). It is a non-reportable category; in other words, the amount of sales does not require reporting. BC utilizes Peroxide. Peroxide does not contain EPA numbers. HCT does not make biocidal claims. WaterSOLV™ Products suppress the environment conducive to the support of algae and bacteria.</p>

<p>PCKAGING, GALLONS</p>	<p>HCT WaterSOLV™ 5, 55, 265, 5400 WaterSOLV™ Curative 5, 55, 265, 5400 WaterSOLV™ BC 5, 53, 305</p>
<p>TESTING</p>	<p>Minimum Water and Soil Analyses Include water Total Bacteria (not e. coli, SRB or coliforms)</p>
<p>TIMING</p>	<p>The rate of reaction can be manipulated over timing by increasing or decreasing the application rates. You must observe the "PRIOR TO TREATMENT" cautions.</p>
<p>TOPICAL TREATMENT</p>	<p>The industry is accustomed to lowering pH, adding water and making available nutrition – not much different than dissolving scale in a beaker. The industry is not accustomed to evaporating the acidified water to dryness and rehydrating it. What its overlooked is the scale formed does not dissolve. We see this in our soils globally as water puddles, infiltration is negligible, runoff is significant and beneath the soil begins to turn anoxic, deprived of oxygen, with black layers, root rot, odors and slime barriers. Yet have the minerals are in the soil, we lower the pH, and we're still adding calcium sulfate or some other form of driving the nutrients into our plants. Year over year more acid and more gypsum, with less infiltration and tissue nutrient shortages.</p> <p>Using acid to lower pH works for about three years then the problems and expenses begin – insoluble evaporative salts of minerals, nutrients and metals, as was studies and reported by University California Davis - Solubility of Salts/Solubility Equilibria.</p> <ul style="list-style-type: none"> A. The Solution: Convert the minerals and metals to nutrition so they can form scale and they readily hydrate with water. B. Detoxify sodium. C. Maintain an aerobic soil profile. <p>1/10th the acid Safer acid Same acid cost, less ancillary products cost Sodium, ferric and calcium chloride remediation Less acid year over year Crops respond with vitality Restored infiltration reduces the toxicity of acidified N, sodium and chloride as well as anoxic anaerobic bacteria.</p>
<p>WHY CHEMICAL INJECTION</p>	<p>To attack the problems at the source so that we do not have to compete with carbonate over and over again at enormous expenses.</p> <p>To attack the bacteria for the same purpose, no colonies are byproducts to mitigate.</p>

PH DRIVEN? No. It is the disassociation of cations and anions to form high grade consumables and to detoxify toxins.

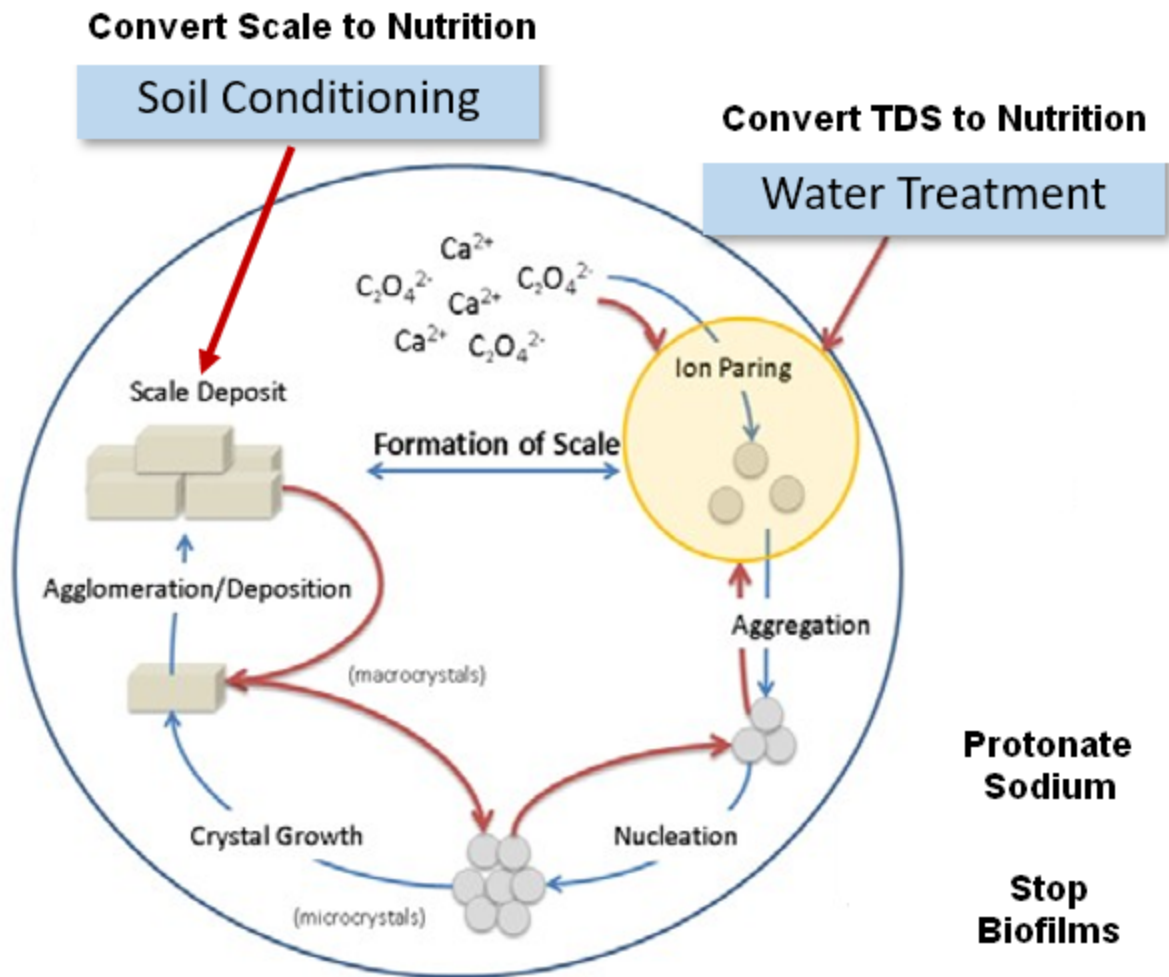
Calcium, Magnesium Carbonate	Calcium, Magnesium acetate, glycolate, +++
Sodium, Calcium and Ferric Chloride	Sequestered and protonated
Bacteria, colonies, slimes and toxins	Dissolved Oxygen and Water

PH VALUES?

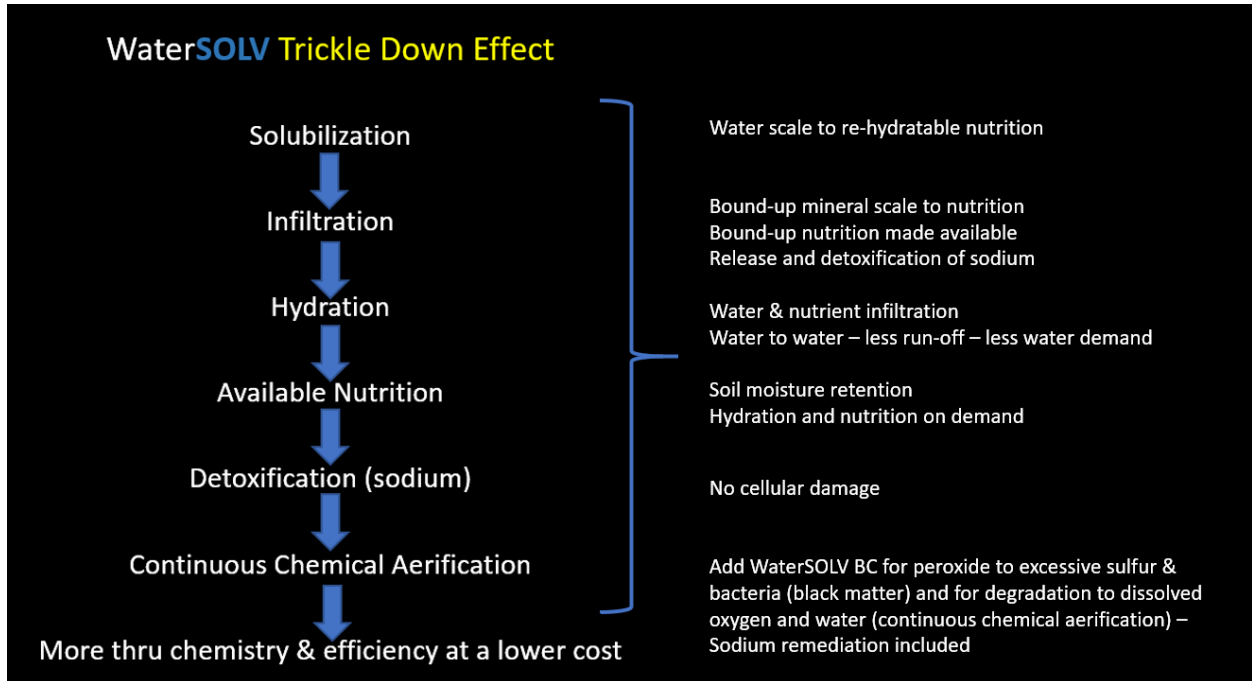
Linear feed to hardness and bicarbonates, pH values will remain lower than 8.2.

Notes:

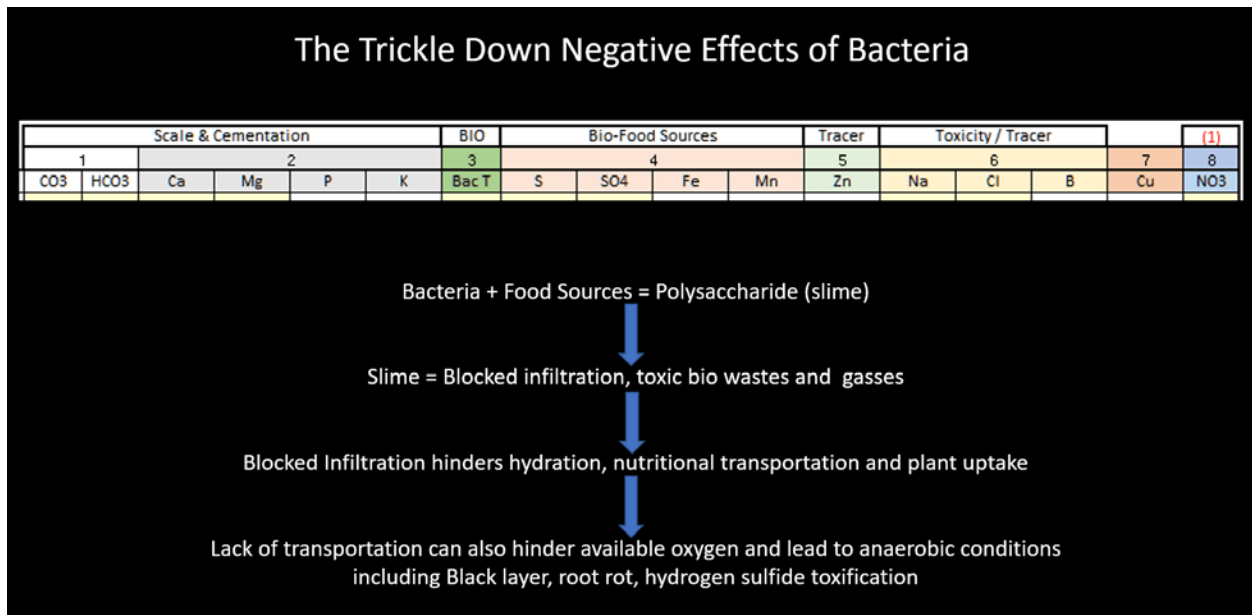
THE FORMATION OF SCALE, as water evaporates. . .



THE VALUE OF INFILTRATION



NEGATIVE EFFECTS OF BIOLOGY



BACTERIA ARE CHRONIC ISSUES ACROSS MARKET SEGMENTS

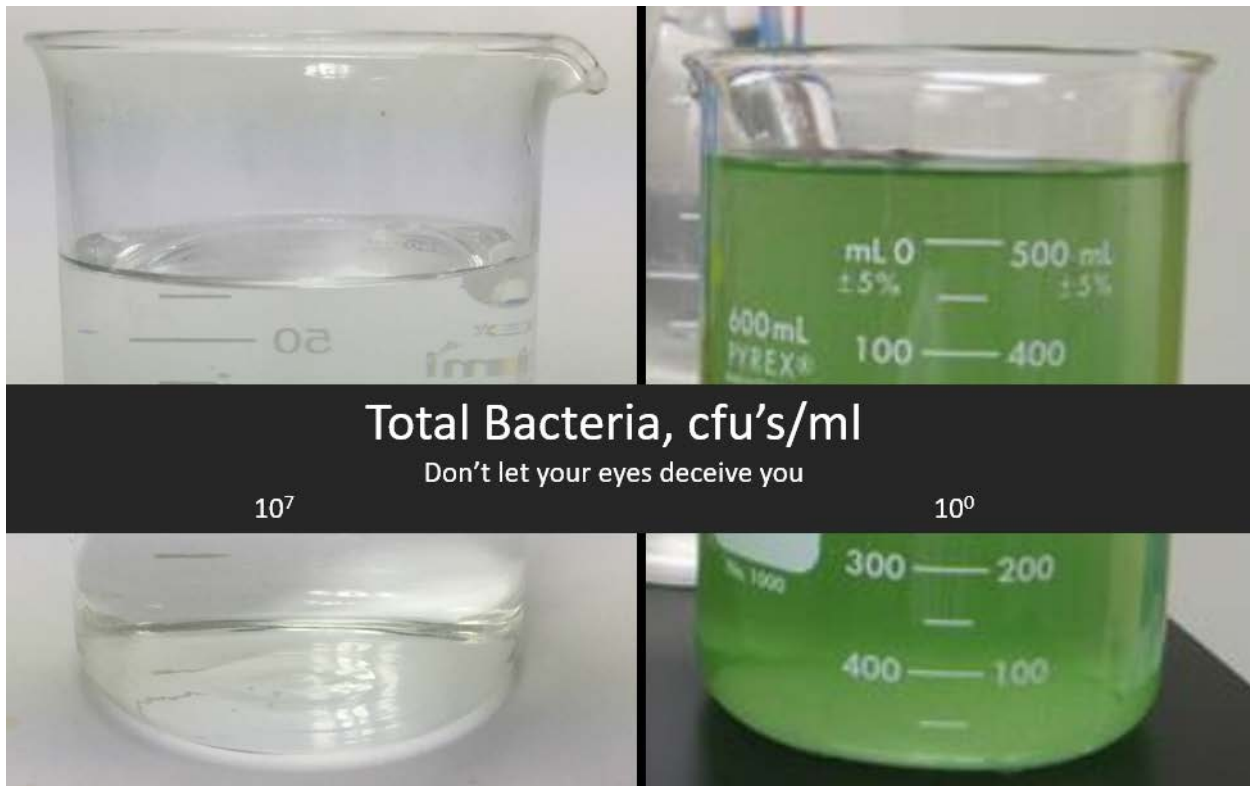
Golf Turf Management

L.B. (Bert) McCarty
Department of Plant and Environmental Sciences
Clemson University
Clemson, South Carolina

CRC Press
2018

Bacteria also help decompose turf thatch by breaking down simple organic compounds such as plant exudates and other compounds. In the absence of gaseous O₂, anaerobic Thiobacillus bacteria dominate, utilizing compounds such as nitrates, sulfates, and iron (ferric) oxides in metabolism.

PLEASE DON'T BE FOOLED, clear can be worse bacteria than green!



RAIN DOES FLUSH SALTS, but only sodium and zinc, if infiltration is not compromised. Rain (nor RO or DI water) DOES NOT dissolve evaporative salts, scale, cementation, bound nutrients, calcium chloride, ferric chloride or biofilms to remediate infiltration problems. Rain does deliver, usually much needed dissolved oxygen.

All Types of Scale in Pure Water

Insoluble



All Types of Scale in Water with WaterSOLV™

Converted to High-grade Available Nutrition



WaterSOLV™ Curative - Better than Rain when it comes to Scale



WaterSOLV™ BC – Better then rain when it comes to Dissolved Oxygen