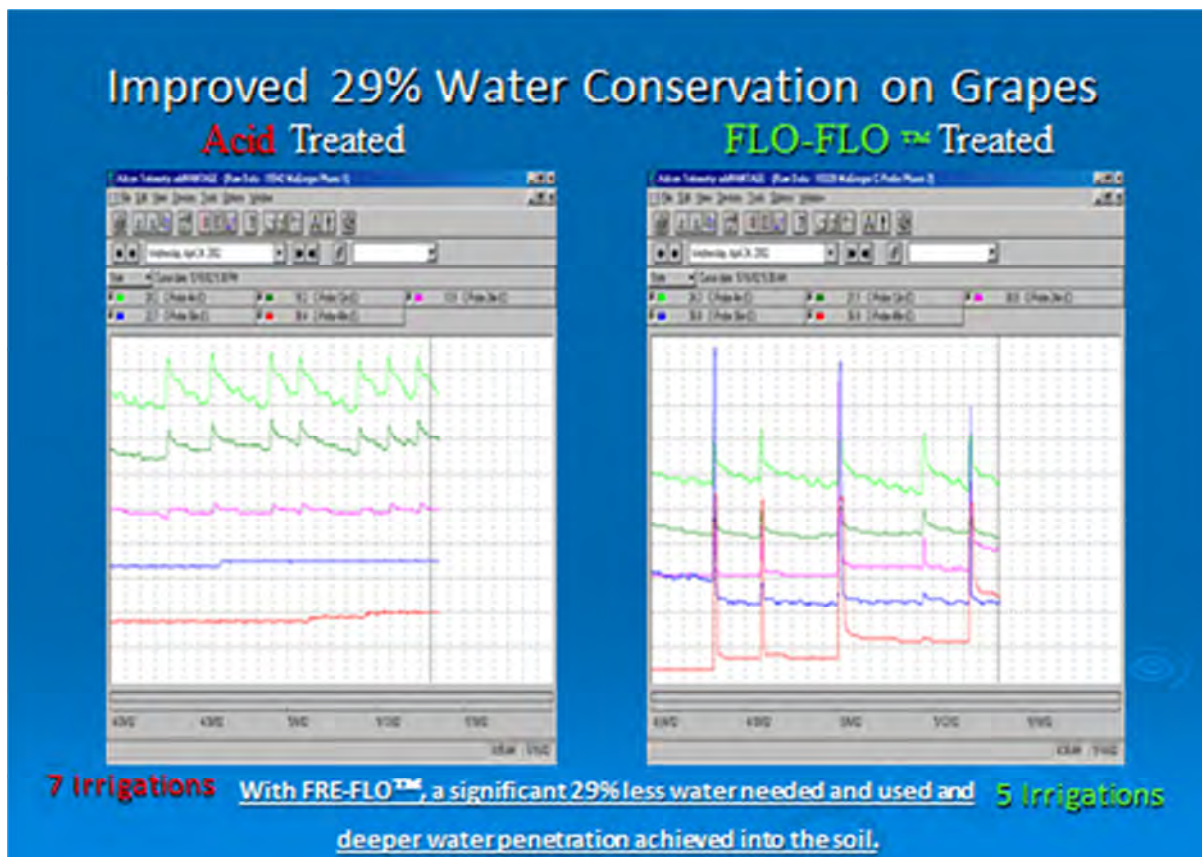


FRE-FLO™ IRRIGATION RESEARCH: SAMPLE PHOTOS & CHARTS OF FRE-FLO™ VS. NON FRE-FLO™

From the FRE-FLO™ Research Library
Conditioning Water Naturally Since 1972™



Irrigation charts above show water use for grapes grown side-by-side without and with FRE-FLO™ water (all other factors the same). Notice the control side (acid treated) required 7 irrigations, while the FRE-FLO™ side only needed 5 irrigations, further contributing to excellent water management and 29% less water needed!

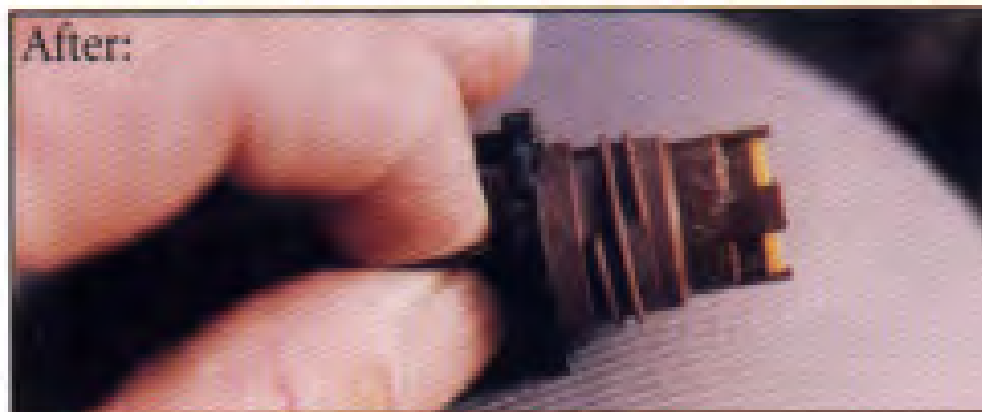
www.freflowater.com

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IRRIGATION EQUIPMENT SCALE REMOVAL & PREVENTION

Before-and-after only one month scale comparison in a horticultural operation demonstrates the highly efficient FRE-FLO™ removal of scale deposits for water-using equipment, such as irrigation equipment (see emitter in the photos below). FRE-FLO™ water conditioning technology produced cost-effective descaling results, reducing maintenance costs.

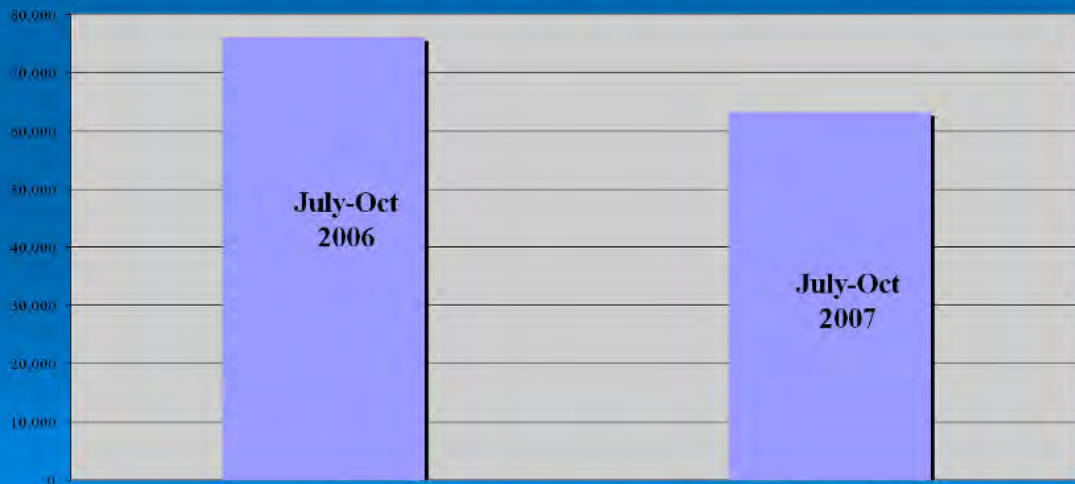


FRE-FLO™ WATER CONSERVATION & WATER MANAGEMENT

The following water use chart shows results before FRE-FLO™ and after a FRE-FLO™ unit was installed on a country club golf course, documenting a noteworthy water conservation of 16% using FRE-FLO™ conditioned water. Remarkably, this water management improvement with FRE-FLO™ technology took place while using reclaimed water.

Excellent 16% Water Conservation

Calabasas, CA Country Club achieved 16% water reduction after a FRE-FLO™ was installed, saving \$28,000 in only 4 months, while providing excellent quality turf!



FRE-FLO™ WATER CONSERVATION & WATER MANAGEMENT

Brookside Country Club (No. Calif.)

Golf Course Results After Installation of FRE-FLO™:
25% Water Conservation and
Deeper Percolation of Water Into Soil

As another example of FRE-FLO™ water conditioning results over a time period of only 4 months, a golf course reduced water use on the course by 25% (4.1 acre feet per week) after a FRE-FLO™ was installed. Note that when water is able to penetrate deeper into the soil (instead of water wastefully evaporating off the soil surface), considerable water savings result. The following chart of Soil Penetrometer readings on this golf course shows a considerable improvement in soil moisture depth with FRE-FLO™ conditioned water. Fairways 1, 7, and 11 (shown in the chart) had the most severely compacted soil on the golf course. Initially, water was not able to penetrate very deeply into the soil. As the chart documents, over time the turf experienced a general increase in the depth of water penetration into the soil after a FRE-FLO™ was installed.

Soil Penetrometer Readings			
After FRE-FLO™ Installation in July 1992			
Location	8/31/92	9/28/92	10/22/92
Fairway # 1	1"	2"	8"
Fairway # 7	Tip	18"	17"
Fairway # 11	9"	18"	32"

IMPROVED SPEED OF PERCOLATION INTO SOIL WITH FRE-FLO™

Note the strikingly different results in this side-by-side water percolation test, demonstrating how FRE-FLO™ conditioned water penetrates into the soil much faster and much deeper than non FRE-FLO™ water. This FRE-FLO™ rapid percolation quality contributes to considerable water conservation, as FRE-FLO™ water is able to get to the plant root zones instead of evaporating off the soil surface.

WATER PERCOLATION AND INFILTRATION COMPARISON

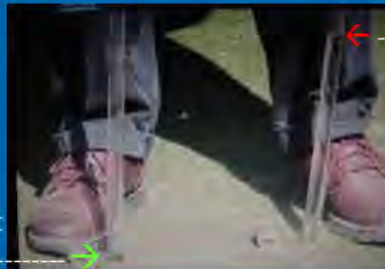
Another impressive benefit is FRE-FLO™ treated water goes into the soil much faster, much deeper (so water does not pool on the surface and evaporate off).

➤ On the left, ½ cup of FRE-FLO™ treated water was poured into a tube inserted into the ground.

➤ On the right, at the exact same time, ½ cup of untreated water was poured into a tube inserted into the ground.

Untreated water still 13" above ground

FRE-FLO™ water at ground level



➤ After only 3 minutes, the FRE-FLO™ treated water on the left had already reached ground level.

➤ After 3 minutes, the slowly moving untreated water still had 13" of water remaining above ground.

IMPROVED ROOT DEVELOPMENT WITH FRE-FLO™ CONDITIONED WATER

Since initial root development can influence the results of crops and plants, we consider it important to be aware of differences in root propagation using FRE-FLO™ vs. Non FRE-FLO™ water.

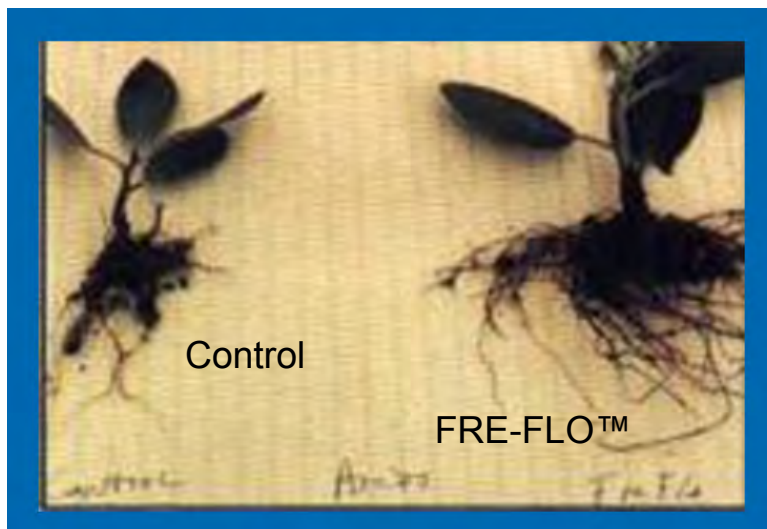
Comparison of FRE-FLO™ vs. Non FRE-FLO™ Root Development in the Arctostaphylos Manzanita Plant

A side-by-side root development test of the Manzanita plant resulted in significant differences, as shown in the chart and photo. After 10 weeks none of the untreated plants had initiated roots, while a third of those growing in FRE-FLO™ conditioned water had started roots. After 16 weeks, only a quarter of the non FRE-FLO™ (control) plants had initiated roots, compared to two-thirds of the plants irrigated with FRE-FLO™ conditioned water.

Root Development Chart Showing
Percent of Root Initiation in Arctostaphylos Manzanita

Time	FRE-FLO™ Water	Control (untreated water)
10 weeks	33%	0%
12 weeks	58%	8%
16 weeks	66%	25%

As shown in the photo, the plant on the right grown with FRE-FLO™ conditioned water had a much healthier and much more developed root system in the same length of time (compared to the Control plant on the left).



CROP, PLANT, AND TURF QUALITY

Comparison of alfalfa grown side-by-side, with
FRE-FLO™ conditioned water vs. non FRE-FLO™

Exceptional Alfalfa Results with FRE-FLO™



FRE-FLO™
Treated

No FRE-FLO™

Alfalfa with FRE-FLO™ Produces Fuller, Healthier Plants

CROP, PLANT, AND TURF QUALITY

Comparison of Palm Trees grown side-by-side
without and with FRE-FLO™ water

Control plant



FRE-FLO™ watered plant



FRE-FLO™ conditioned water used as a soil amendment tool improved plant health and growth.

CROP, PLANT, AND TURF QUALITY

90-Day Comparison of Before-and-After FRE-FLO™ on Turf

BEFORE

White alkali build-up visible on the soil,
with very uneven density of turf.



AFTER

Alkali moving to below the root zone,
with turf filling in.



Much improvement is visible after only 90
days for health, more even growth, and
density of turf.

CROP SHELF LIFE

Photos show shelf life comparisons of strawberries (grown side-by-side, with and without FRE-FLO™ water) and stored side-by-side.

Strawberry Shelf Life Test Results

Day 6 Control



Day 6 FRE-FLO™ Test



Day 10

The control berries have liquefied. The cell structure has broken down. By contrast, the FRE-FLO™ berries are still edible on day 10.



Control



FRE-FLO™ Test

CROP SHELF LIFE

Photos show shelf life comparisons of bell peppers (grown side-by-side, without and with FRE-FLO™ water). The writing on each pepper documents which is control and which is FRE-FLO™ and the date on which the test was initiated.

Shelf Life Outcomes Barron Bell Peppers

Control shelf life test started 10/25/13

FRE-FLO™ shelf life test started 10/25/13

After just 16 days there is water loss, with wrinkles, and shorter shelf life.

After just 16 days, less water loss, less wrinkles, and longer shelf life.



Control pictured on 11/16/13
Results after 22 days

FRE-FLO™ pictured 11/16/13
Results after 22 days



CROP YIELD AND SALEABILITY RESULTS

Side-by-side photos of saleable yield with FRE-FLO™ conditioned water vs. non FRE-FLO™ water on tomatoes, show how FRE-FLO™ technology is protecting growers' profitability. Roma tomatoes grown with FRE-FLO™ treated water produced a larger and higher quality crop, compared to controls grown with untreated water. The increase came from two factors: a 23.9% increase in overall saleable yield, plus a more rapid ripening, which cut the quantity of unsaleable green tomatoes in half.



23.9% Increase in Saleable Crop

MOLD ELIMINATION RESULTS

FRE-FLO™ Water Technology Eliminated Mold While Increasing Walnut Yield by 15% and Increasing Walnut Quality

Treating the irrigation water for an 11.5 acre walnut orchard with a FRE-FLO™ water conditioning unit eliminated mold and substantially increased yields 15% over the previous year. With FRE-FLO™ there was also a 27% increase in the highest grade Jumbo size walnuts and a 24% increase of premium Light colored walnuts, qualities that command a higher price. As a result of crop maturity only one harvest was needed, instead of the normal two, resulting in the entire cost of the FRE-FLO™ paid back in the first year. The before-and-after chart below shows a comparison of mold, crop yield and quality with non FRE-FLO™ water and the next year with FRE-FLO™ conditioned water.

Chandler Walnut Yields 2012 vs. 2013 with FRE-FLO™ Installed Nov. 2012										
	Harvest Date	Total Lb. Delivered	%Size				%Merchantable Color			Mold
			Jumbo	Large	Med	Baby	Light	Lt Amber	Amber	
W/o FRE-FLO	10/29/12	38,440	69.1	20.2	6.5	1.8	82.5	10.0	1.2	0.8
With FRE-FLO	10/14/13	44,287	76.0	13.0	6.0	4.0	89.0	4.0	3.0	0.0
	Change	+5,847	+6.9	-7.2	-0.5	+2.2	+6.5	-6.0	+1.8	-0.8

Several factors contributed to improving the grower's profitability:

- FRE-FLO™ facilitated a solution for mold. Mold dropped from 0.8% in the previous year to zero when treated by FRE-FLO™, resulting in a higher valued crop. Mold in walnuts is caused when the husk does not split as the walnut reaches physiological maturity. When the husk does not open, the excess moisture causes mold inside the nut. Thus, with the FRE-FLO™ Water System, the walnuts achieved the desired level of physiological maturity and mold was eliminated.
- Analyzing the data shows the total walnut yield with FRE-FLO™ was increased 15% over 2012. Also of importance, the weight of Jumbo walnuts in 2012 was 26,600 pounds, which is 69.1% of the total weight of 38,440 pounds. Using FRE-FLO™ in 2013, Jumbo walnuts totaled 33,700 pounds, which is 76% of the total weight of 44,287 pounds. The increase is 7,100 pounds of Jumbo walnuts or an increase of 27% over 2012.
- The weight of higher quality Light walnuts in 2012 before FRE-FLO™ was 31,700 pounds, which is 82.5% of the total weight of 38,440 pounds. The weight of Light walnuts in 2013 with FRE-FLO™ was 39,400 pounds, which is 89% of the total weight of 44,287 pounds. The increase with FRE-FLO™ is 7,700 pounds of Light walnuts or an increase of 24% over 2012.

RESULTS WITH POOR QUALITY WATER EXCEPTIONALLY HIGH IN TOTAL DISSOLVED SOLIDS (TDS)

FRE-FLO™ CAN PROVIDE GOOD RESULTS WITH WATER THAT OTHERWISE COULD BE UNUSABLE

A key reason for this field study: what to do with water very high in TDS that is often unusable in agriculture. An eight year study (2002-2010) compared oranges grown with FRE-FLO™ vs. without FRE-FLO™. The water used for the FRE-FLO™ crop was from the rejectate water coming out of a FRE-FLO™ Reverse Osmosis System with a very high TDS of 2,644. The non FRE-FLO™ crop had water with a much lower (better irrigation quality) TDS of 1,325. Note that although the oranges grown with FRE-FLO™ had a water source with much worse TDS than the non FRE-FLO™ oranges, the FRE-FLO™ oranges had much better results!



Data collection was by the Field Operations Manager and a Certified Crop Advisor. Two representative trees were selected to evaluate the differences between the control and the FRE-FLO™ test crop. The FRE-FLO™ tree was selected due to the close proximity to the FRE-FLO™ Reverse Osmosis drain line (for the toughest possible test of FRE-FLO™) and the control tree because it was not irrigated with FRE-FLO™ treated water. Twenty of the largest oranges were selected from each tree.

<u>Control Tree</u>	<u>FRE-FLO™ Treated Tree</u>	<u>FRE-FLO™ Increase</u>
12 pounds	17 pounds	42% crop increase
11.4 Brix	15.2 Brix	33% Brix increase

Summary

With irrigation water quality posing a problem around the world, note the bottom line water management results. Even with very high TDS water, FRE-FLO™ technology provided increased crop yield in pounds (by a large 42%) and quality (with the advantages of a 33% brix increase)!

RESULTS WITH POOR QUALITY WATER EXCEPTIONALLY HIGH IN TOTAL DISSOLVED SOLIDS (TDS)

FRE-FLO™ CAN PROVIDE GOOD RESULTS WITH WATER THAT OTHERWISE COULD BE UNUSABLE

Photos below from the eight year side-by-side orange crop research (described on the previous page) show considerable differences in tree health. Importantly for crop and tree health, the soil irrigated with FRE-FLO™ treated water has not hardened from the high mineral, high TDS content of the water. The FRE-FLO™ water still percolates into the soil very well. The FRE-FLO™ trees and fruit are thriving, much better than the non FRE-FLO™ trees and fruit. The test demonstrates that it is possible to use exceptionally poor quality water, that is FRE-FLO™ treated, and produce excellent results.



The FRE-FLO™ trees are fuller, with more fruit, and larger fruit.



The control trees have less foliage, less fruit and smaller fruit.

HEALTH OF CROP FIELDS



Successful Leaching of Harmful Salts Improves Sustainability and Health of Crop Fields

The photo above compares the health and development of a side-by-side field test on an alfalfa crop, comparing the crop grown with and without FRE-FLO™ conditioned water. The field results also demonstrate FRE-FLO™'s ability to successfully reduce excessive sodium levels in the soil (that can damage crops). With less soil salinity, the FRE-FLO™ crop had a much greater crop yield. This added advantage of having harmful salts leached to below the root zone produced increased profitability for the FRE-FLO™ crop.

FRE-FLO™ DECREASES HARMFUL SOIL SALINITY

- On the right without FRE-FLO™, notice the harmful white sodium build-up on top of the soil and the unhealthy plants.
- As shown on the left, FRE-FLO™ has opened up the soil of calcium carbonate deposits. Then excessive amounts of salts (such as sodium and boron) are able to leach out of the top of the soil, and out of the root zone, to below the root zone.

EXAMPLE OF STANDARD FRE-FLO™ INSTALLATION

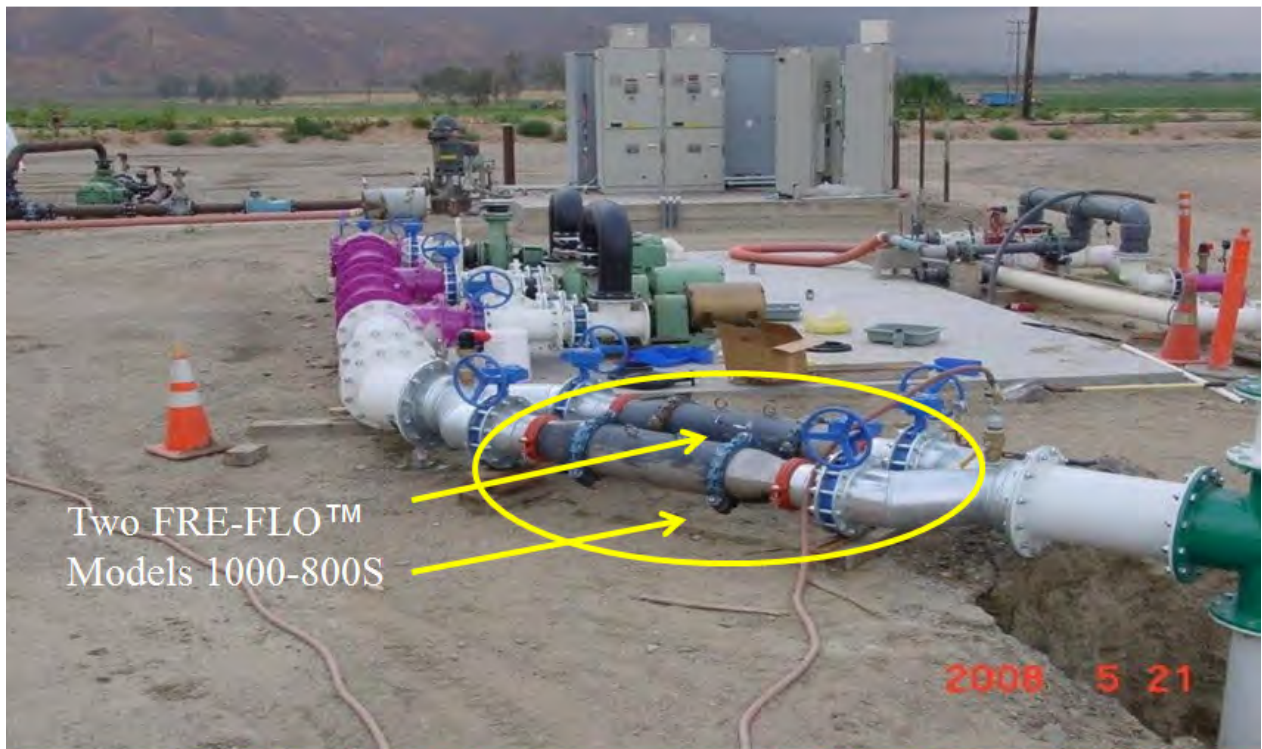
Sample photo of a FRE-FLO™ unit installed on a farm.



Shown is a FRE-FLO™ Model #1000-800S, capable of conditioning a water flow rate of 750 to 1,500 gallons per minute (gpm), installed on an 8" irrigation pipe line with a 1,200 gpm water flow.

EXAMPLE OF SPECIALIZED FRE-FLO™ INSTALLATION

Photo of a specialized installation for a
wider variable range of water flow rate.



Specialized multiple unit FRE-FLO™ installations can handle a very wide range of water flows, in this case from 750 to 3,000 gallons of water per minute flow rate for a dairy.

FRE-FLO™ welcomes an exploration of ways to reduce costs and protect your profitability with FRE-FLO™ water conditioning technology.

Reports of the Effects of the **FRE-FLO™** Scale Prevention Equipment/Soil Amendment Tool In Agricultural Applications

Results of FRE-FLO™ project at:
SUNDANCE FARMS – COOLIDGE, ARIZONA

Executive Summary

Using FRE-FLO™ to treat irrigation water with moderately high concentrations of sodium and other minerals, the **sodium level was decreased by 56%** within the top 8" of soil during the growing of just one crop. This dramatic improvement of conditions in the growing medium could partially explain the **12% increase in yield** because the ready availability of water during fruit sizing is very important in the yield of seedless watermelons. The result was **increased annual gross income of \$1,091 per acre.**

Detailed Report

When Sundance Farms initiated a test of FRE-FLO™ on seedless watermelons, their operation consisted of 4,000 irrigated acres; approximately 2,000 acres were surface irrigated and the other 2,000 acres were drip irrigated. Principals Howard Wuertz (an owner) and Scott Tolfson (Managing Agronomist) managed the test and provided the data below on a portion of the drip irrigated crop. A 6" FRE-FLO™ was installed on an existing valve manifold so that FRE-FLO™ conditioned water would be supplied to an 11 acre field designated C-Base Block #5. The adjacent fields, C-Base Blocks #3, #4 and #9, totaled 32 acres and were irrigated with unconditioned water. **All other factors were equal.** TABLE 1 is the analysis of the well water supplied to all 43 acres and TABLE 2 indicates the seedless watermelon yields of these various test blocks.

TABLE 1

Analysis of Well Water Supplies to C-Base Blocks #3, #4, #5 and #9

General properties of the water

ECw 2.4, pH 9.0, SAR adj. 37.8, Total of 2,844 lbs of salt applied per Acre/ft of water.
USDA Classification C4-S4.

Mineral Content

<u>Mineral</u>	<u>ppm</u>	<u>Mineral</u>	<u>ppm</u>	<u>Mineral</u>	<u>ppm</u>
Calcium	7.5	Carbonate	4.8	Sulfate	52.0
Magnesium	0.0	Bicarbonate	43.9	Nitrate	2.0
Sodium	396.0	Chloride	420.0	Boron	1.3

The USDA classification of **C4-S4** indicates a **high** sodium and salinity hazard. Although crop irrigation is possible with this water, copious amounts of additional water (referred to as “the leaching fraction”) must be used to leach the salts out of the root zone to assist crop production.

TABLE 2

Seedless Watermelon Yield Sundance Farms' 1989 Spring

Location	Crop Tons/Acre	<u>% Increase Over Control</u>
Block C-5 (FRE-FLO™ Treated Water)	36.32	12%
Blocks C-3, 4 & 9 (Untreated Water)	32.45	----

The 12% yield increase with FRE-FLO™ represents a \$12,000 increase in annual gross income for the 11 acres (\$1,091 per acre) over the yield on the other 32 acres used as Control. Sundance Farms personnel reported that although they were looking for any differences in plant growth, tissue analysis and fruit analysis during the growing season, the only difference noted was the 12% increase in yield. Otherwise the produce was comparable.

When a post-harvest soil analysis was conducted on the top 8" of soil from each of the blocks, Sundance Farm personnel recorded the data as evidenced in TABLE 3 below.

TABLE 3

**Post-Harvest Soil Analysis, Seedless Watermelons
Sundance Farms / October 1989**

FRE-FLO™ Treated Water - Soil Source: Block C5 (Stated in ppm)

<u>Na</u>	<u>Ca</u>	<u>Mg</u>	<u>K</u>	<u>Fe</u>	<u>Zn</u>	<u>Mn</u>	<u>Cu</u>	<u>S</u>	<u>NO₃</u>	<u>PO₄</u>	<u>ECs</u>
565	7900	340	400	7.5	0.64	11	0.7	170	32.8	11	6.0

Control Area - Soil Source: Blocks C3, 4 & 9:

<u>Na</u>	<u>Ca</u>	<u>Mg</u>	<u>K</u>	<u>Fe</u>	<u>Zn</u>	<u>Mn</u>	<u>Cu</u>	<u>S</u>	<u>NO₃</u>	<u>PO₄</u>	<u>ECs</u>
1220	8000	430	550	8.1	0.57	13	1.1	220	32.1	10	7.3

Note that on the FRE-FLO™ block the **salt level was decreased by 54%** within the top 8" of soil! This dramatic improvement of conditions in the growing medium could partially explain the 12% increase in yield because the ready availability of water during fruit sizing is very important in the yield of fresh fruit.

The reduction of sodium in the upper level of the soil profile as just seen, means that the plants in the FRE-FLO™ treated water block could more readily extract water from that portion of the soil profile. Removal of the salt concentration from the root zone allowed the fruit to absorb more water and thus produce a larger yield than usual in the same soil. Also evident is the reduction of potassium – and it is logical to assume that this happened because as the fruit was being produced in the larger quantity, it was doing so by drawing off and utilizing the potassium present in the soil. The EC of the soil decreased as would be expected with the decrease of the sodium concentration.

Reports of the Effects of the **FRE-FLO™** Scale Prevention Equipment/Soil Amendment Tool In Agricultural Applications

Results of FRE-FLO™ project at:
UNIVERSITY OF CALIFORNIA – RIVERSIDE, CA



Executive Summary

A researcher at the University of California, Riverside tested the impact of FRE-FLO™ on water delivery through drip irrigation systems. He found:

- Tubing using **FRE-FLO™ treated water containing fertilizer delivers 230% more water** per hour to the plants' root systems than the tubing without FRE-FLO™.
- **FRE-FLO™ delivers 46% more water containing fertilizer than tubing without FRE-FLO™ and without fertilizer.**
- There was **greater yield of the broccoli crop using FRE-FLO™.**

Detailed Report

Objective:

Test impact of FRE-FLO™ on water delivery through drip irrigation systems.

Study Design:

The approach was to compare the delivery of water with and without FRE-FLO™, using subterranean tubing on a crop of broccoli.

Results:

Delivery of water with medium duty tubing on Monday, March 22, 1982

Using FRE-FLO™ with a neutral fertilizer:	0.83	gallons	per	hour
Without FRE-FLO™ with low pH fertilizer:	0.25	gallons	per	hour
Without FRE-FLO™ with no fertilizer:	0.57	gallons	per	hour

Observations:

We noticed the tubing without FRE-FLO™ with low pH fertilizer seemed to have a sludge build-up at the end of the tubes, while there was no such buildup in the tubes using FRE-FLO™. We also observed a greater yield of the broccoli crop.

Conclusions:

The tubing using FRE-FLO™ treated water with a neutral fertilizer delivers 230% more water per hour to the plants' root systems than the tubing without FRE-FLO™ and a low pH fertilizer. Compared to the tubing without FRE-FLO™ and without fertilizer, FRE-FLO™ still delivers 46% more water, plus the beneficial impact of the fertilizer. This impact was reflected in the greater yield of the broccoli crop using FRE-FLO™

Report prepared by Dr. Jack Rible, University of California, Riverside, 1982.

Agronomy



Date: March 18, 2008
To: Central Valley Fieldmen & Managers
From: Bill Galli

Spring 2007 Quail H Farms purchased 3 FRE-FLO'S to be installed on three of the poorest quality wells. All fields are organic Sweet Potatoes.

The first observation was that the seedlings propagated with The FRE-FLO treated water did not have any tip burn where the previous crop in the same field and same well water exhibited tip burn that stunted the start of the crop.

The farm manager elected to move the units from field to field for the 2007 season. For the 2008 season all of the poor water quality wells will have a FRE-FLO installed. There will one FRE-FLO installed on a good water quality well for yield and quality evaluation.

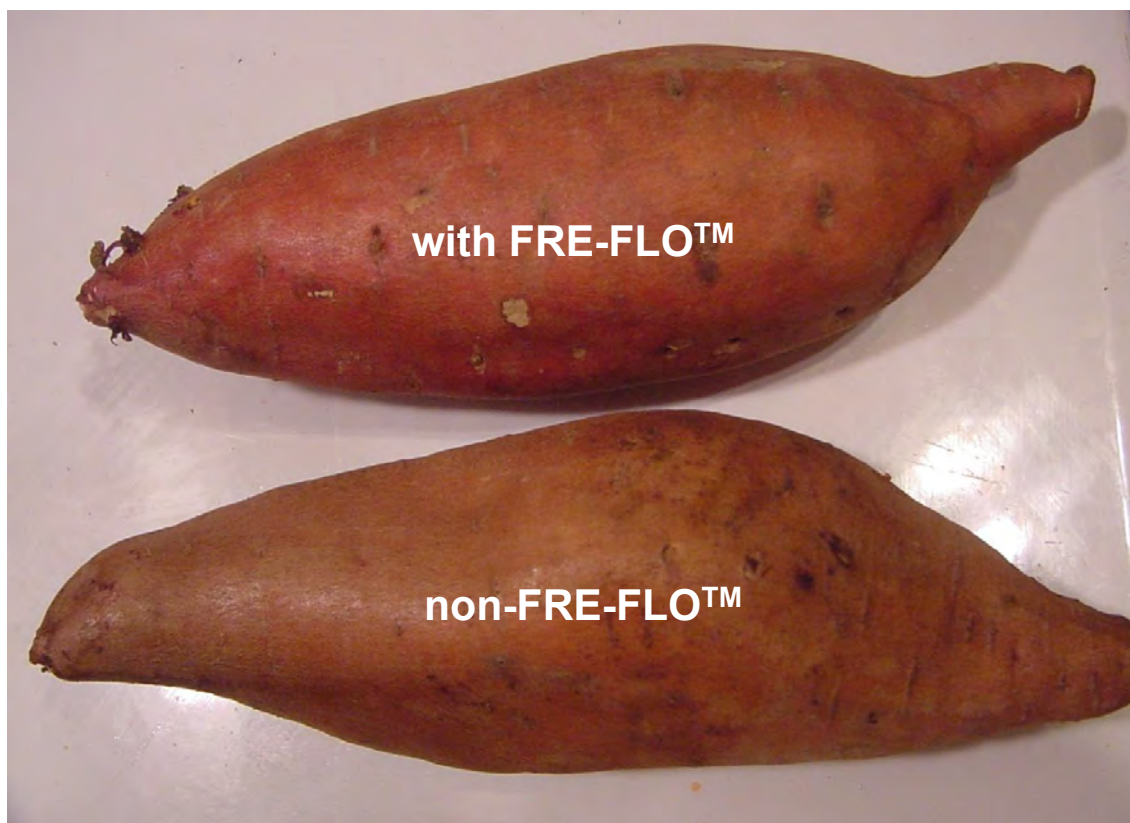
Bill Galli

Western Farm Service - Visalia Branch
Phone 559-686-3375 Fax 559-686-4276

Lab analysis from Quail H Farms

Leaf Analysis of Sweetpotatoes with With and With out FRE-FLO																
Analysis by Albion Labs																
Sweetpotatoes at Howard Rd and Hwy 140																
w FF is middle FRE-FLO row ,							w/o FF is 2nd Row E no FRE-FLO									
Nutrient Levels	%							PPM							Zn	Mo
	N	S	P	K	Mg	Ca	Na	ppm NO3-	ppmFe	ppmAl	ppmMn	ppmB	Cu			
w FF	4.72	0.36	0.25	2.06	0.36	1.25	0.011	250	408	488	76	94	14	24	1.85	
w/o FR	4.62	0.37	0.25	2.09	0.39	1.46	0.022	343	403	464	67	105	9	21	2.57	
Optimum Range	3.4	0.25	0.23	3.1	0.35	0.7	<0.5	40	<250	40	25	5	20			
	4.5	0.5	0.5	4.5	1	1.2		200		250	75	20	50			
w FF	-1.32	-0.11	-0.02	1.04	-0.01	-0.55	-0.011	?	-368	-238	-36	-69	-9	-4	?	
w/o FR	-1.22	-0.12	-0.02	1.01	-0.04	-0.76	-0.022	?	-363	-214	-27	-80	-4	-1	?	
F better	-0.1	0.01	0	0.03	0.03	0.21	0.011	?	-5	-24	-9	11	-5	-3	?	
F better	-8.2%	8.3%	0%	0%	75.0%	27.6%	50.0%	?	-1.4%	-11.2%	33.3%	13.8%	?	-300%	?	
	insignific	insigni	insigni	insignificant	insignific	significant	significant		insignific	insignificant	insignific	significant	insig	insignificant		
	Middle FRE-FLO Row				w/FF	w/o FF		w/FF	w/o FF	2nd Row E. No FRE-FLO						
Albion Analysis	Nutrient Level	Mineral Name	Nutrient Index	Nutrient Index	Difference	FF better	Scores		Diff from C	Nutrient Level	Mineral Name	Nutrient Index				
	Very low	K	-54	-54	0	0	54	54	54	Very low	K	-54				
	Low	Mg	-24	-23	-1	-1	24	23		Low	Zn	-23				
	Low	P	-22	-22	0	0	22	22		Low	Mg	-22				
	Low	Zn	-19	-22	3	3	19	22		Low	P	-22				
	Low	Mn	-17	-20	3	3	17	20		Low	Mn	-20				
	Low	S	-6	-14	8	8	6	14		Low	Cu	-14				
	Optimum	Cu	0	-6	6	6	0	6		Low	S	-6				
	Optimum	Ca	20	20	0	0	20	20		Optimum	N	20				
	High	N	24	36	-12	12	24	36		High	Ca	36				
	High	B	31	40	-9	9	31	40		High	B	40				
	Very High	Fe	68	66	2	-2	68	66		Very High	Fe	66				
			1	1			38	285	323							
							12%									
The Albion system ranks the balance of the nutrients, The closer the Nutrient Index is to 0 the better the balance of nutrients																
You never get all mineral elements to be 0. You want to be in the -30 to 30 range for generally acceptable growth and yield.																
The FRE-FLO leaves have a slightly better balance of nutrients than the No FRE-FLO leaves.																
The difference is slight and may not be significant.																

Notice the rich color of the
FRE-FLO™ Grown Sweet Potato!



Sixty Day Shelf Life Test

Reports of the Effects of the **FRE-FLO™** Scale Prevention Equipment/Soil Amendment Tool In Agricultural Applications

Results of FRE-FLO™ project at:
COLONY VINEYARD – SACRAMENTO COUNTY, CA

Executive Summary

The FRE-FLO caused more water to enter the soil and there was less water standing under the grapevines. The **yield in the FRE-FLO™ area was 16% greater** than in the non-FRE-FLO area, even though less water was delivered to the FRE-FLO area during part of the growing season. **The grape sugar content was 7% greater, and the grapes had firmer, healthier skin.** In summary, FRE-FLO provides:

1. Capacity to use less water
2. Capacity to use less power
3. Better soil permeability
4. Better leaching of salts
5. Healthier plants
6. Less stress on plants
7. Increased yields
8. Better quality of crop

Study Methodology

A demonstration project using a FRE-FLO™ as an aid for more efficient water use in irrigated Pinot Noir grapes was conducted from the Spring of 2001 to the Spring of 2002 at the Colony Vineyard located in Sacramento County, California. The FRE-FLO™ was installed at the sub-main, which supplied the water for the seven acres of the most southerly irrigation set in the field. An adjacent seven-acre irrigation set where there was no FRE-FLO™ will be referred to as the no FRE-FLO™ control block.

The water from the well used for irrigation was analyzed for irrigation suitability. The analysis figures indicated the water would cause sodium to accumulate in the surface of the soil. The accumulated sodium would cause the soil to seal up over time and restrict the infiltration of the irrigation water.

Sites to monitor the soil moisture for the season were installed. A Nuclear Pacific neutron probe, DR 503 was used to measure the soil moisture. Soil moisture was measured at one-foot increments to a depth of five feet. Readings were taken once a week (sometimes twice a week) starting on March 31, 2001. The last reading was made on December 4, 2001. The E.C.e and soluble salts were higher in the one-foot level in the FRE-FLO area at the beginning of the test but decreased during the test. This decrease in salt content of the top layer of soil is expected from the ability of the FRE-FLO™ to keep ions in solution which allows the movement of water to move sodium and other ions deeper in the soil profile. The deeper the salt moves into the soil profile the less impact the salt will have on yield and quality. The E.C.e and soluble salts were the same at the one-foot level at the beginning and end of the test in the no FRE-FLO area. The no FRE-FLO water did not move the salts out of the top foot of soil.

On June 26, 2001 it was noticed that the drip emitters on the FRE-FLO™ block were delivering 26 drops per 64 seconds while the drip emitters on the no FRE-FLO™ block were delivering 40 drops per 64 seconds. A spring had broken and was reducing the flow. It was repaired on June 27th, and the flow rate was checked and was found to be the same on both blocks.

That difference in drops per unit time indicated as much as 35 percent less water was delivered to the FRE-FLO™ block up to June 27th. However, there was no indication of moisture stress exhibited by the grapes at that point.

The FRE-FLO™ did seem to cause more water to enter the soil and there was less water standing under the grapevines. The ranch foreman commented several times that the amount of standing water was clearly less where the FRE-FLO™ was installed even after the flow rate was the same.

Resulting Yields

The hand harvested samples indicated the FRE-FLO™ treated area had a 16% higher yield than the no FRE-FLO™ test area:

Yield For FRE-FLO™ Treated Area in Tons per Acre	6.31
Yield For No FRE-FLO™ Control Area in Tons per Acre	5.42

The fruit in the FRE-FLO™ test area was different from the fruit in the no FRE-FLO™ control area. The grapes in the FRE-FLO™ test area were larger and the skin of the grape was firmer. The larger grapes meant bunches from the FRE-FLO™ test area weighed more even if the bunches had the same number of grapes. The larger grapes were probably the major cause of the difference in yield between the FRE-FLO™ test area and the no FRE-FLO™ control area.

The skin of the grapes from the FRE-FLO treated area was much firmer than the skin of the grapes from the no FRE-FLO test area. The skin of the grapes from the FRE-FLO test area did not break while being picked. The skin of the grapes in the no FRE-FLO test area broke easily and often while they were being picked. The grapes from the FRE-FLO area certainly would have a better chance of producing a wine with the desired depth and richness of color.

Measurement of the percent sugar, commonly called brix, was made five different times. The dates of measurements and readings are given in the following table.

<u>Date</u>	<u>FRE-FLO™</u>	<u>No FRE-FLO™</u>
7/29/01	18.0	17.0
8/07/01	22.0	18.0
8/14/01	24.0	22.0
8/18/01	24.0	22.0
8/22/01	24.0	22.5

The data indicate a quicker formation of sugar in the FRE-FLO treated grapes. The grapes in the no FRE-FLO control area were slower in developing sugar and only reached a brix level of 22.5, 7% short of the desired brix level of 24.

The grapes from the FRE-FLO treated area had less disease than the grapes from the no FRE-FLO treated area. Less disease in the grapes also will contribute to a higher quality wine.

The firmer skin of the grapes has importance in the disease resistance of the grapes. It is known that, if more calcium is available to the plant, the cell walls have a greater integrity and are less prone to be infected by disease. The literature in plant nutrition also mentions that when more calcium is available for plant uptake, then more potassium is available for uptake by the plant. The more potassium the plant has available, the more efficient the movement of photosynthate from the leaves to the fruit. This would help explain the larger grape berries observed in the FRE-FLO™ test area. It would also partially explain the higher brix readings seen in the FRE-FLO™ test area compared to the no FRE-FLO™ control area. In addition, grapes under less stress produce sugar faster than grapes under stress.

The basic premise of the action of water passing through the FRE-FLO™ unit is it keeps more ions in solution. The ability to keep calcium ions in solution is a reasonable explanation for the observed better quality grape skin of the grapes in the FRE-FLO™ test area.

This Colony Vineyard demonstration project was:

- Planned by C. David Lakeman, Edith R. James, and Allan L. James, Ph.D.
- Supervised by Edith R. James and Allan L. James, Ph.D.
- Funded by Sacramento Municipal Utility District (SMUD).
- Location graciously provided by Pacific Agrilands.
- Report written by Allan L. James, Ph.D., Agronomist

FRE-FLO™ Percolation Test Results

Almond Trees - Vernalis, CA

A FRE-FLO™ water conditioning unit was installed on one block of irrigated almonds but not on the adjacent block, setting up a FRE-FLO™ TEST and CONTROL comparison opportunity for the evaluation of the FRE-FLO™'s ability to increase soil permeability and improve irrigation efficiency.

Pictured at right is the FRE-FLO™ test unit. Test unit is supplying water to a single row in the orchard. The remainder of the orchard is grower's standard practice.



C-PROBE Soil Moisture Sensors were installed at varying soil levels to record irrigation water percolation.

Two C-PROBE Data Recording Stations were installed, with one monitoring the FRE-FLO™ equipped (TEST) block and the other monitoring the NON-EQUIPPED (CONTROL) block.

Research by:
Crop Production Services, Inc.
Visalia, CA Branch.
Bill Galli, CCA (559) 287-3980

FRE-FLO™ Crop Yield Results Almond Trees - Vernalis, CA.

Non FRE-FLO™ treated almond crop.



FRE-FLO™ treated almonds showing 20% increase in yield and quality greatly improved.



FRE-FLO™ Percolation Test Results

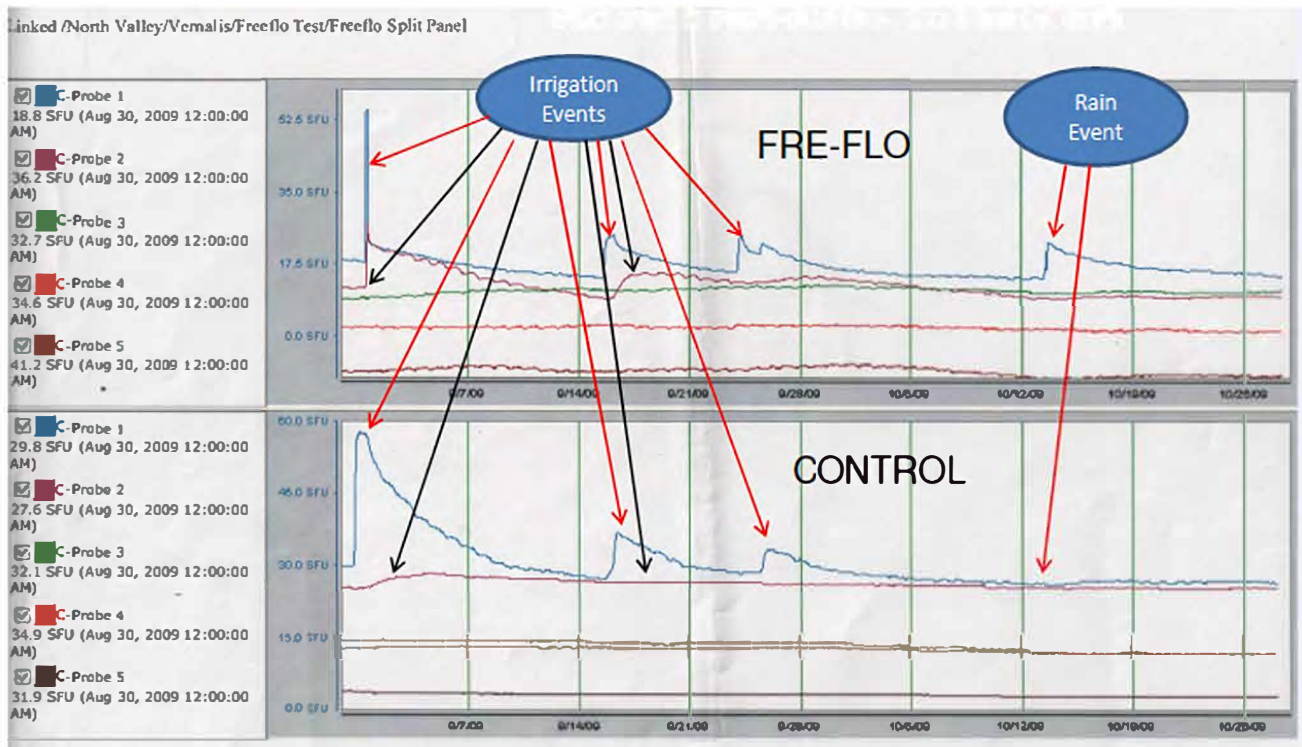
Almond Trees - Vernalis, CA

- The C-PROBE data recorded 3 irrigation cycles, with deeper water percolation in the FRE-FLO™ equipped block.
- Irrigation water applied to the CONTROL block exhibited ponding and produced run-off and irrigation had to be discontinued. This irrigation water ran off or would puddle on top of the soil, only to evaporate, leaving the minerals behind to further reduce the soil quality. No leaching was taking place.
- By contrast, irrigation water in the FRE-FLO™ equipped block absorbed into the soil during the observation period.

In mid-October, a 2-inch rainfall event occurred. The rainfall was absorbed into the FRE-FLO™ equipped block to a depth of 2 feet, but was not absorbed by the CONTROL block. The failure to absorb rainfall, which has low EC, is indicative of soil conditions impacted by sodium and diminished CEC and elevated SAR.

FRE-FLO™ Percolation Test Results Almond Trees - Vernalis, CA

Red arrow to blue line= 1 to 2 foot soil depth
Black arrow to purple chart line= 2 to 3 foot soil depth



Research by:
Crop Production Services, Inc.
Visalia, CA Branch.
Bill Galli, CCA (559) 287-3980

FRE-FLO™ Test Results

Almond Trees - Vernalis, CA

- “Secondly, calcium hardness in the water is mobilized to increase the efficacy of soluble calcium cations to balance SAR, increase CEC, and to displace Sodium, resulting in favorable flocculation of clay particles in the soil, resulting in increased infiltration rates and better uptake by plants.”
- “The data plot from the C-PROBES for the rainfall event document rejection of rainfall with its characteristic low EC on the CONTROL block, a classic symptom of an alkaline dispersed soil with high SAR. The high infiltration rate on the FRE-FLO™ irrigated block indicates that this condition has been corrected.”
- “This result has important implications for both increased irrigation efficiency and water conservation, and for reduction of agricultural run-off and Non-Point Source water quality impacts.”

Concluding comments by Bill Wilson
BW Environmental Planning & Design
(805) 689-7639
e: billwilsonwater@gmail.com

FRE-FLO™ Test Results

Almond Trees - Vernalis, CA

SUMMARY:

“Several synergistic things are taking place: Less surface tension in the water (weaker water-to-water bonds); better hydration of calcium cations; increased calcium solubility; repair of dispersed and/or sodic soils.”

“One way of characterizing this observation is that the FRE-FLO™ conditioned water is acting as an ion exchange water softener in reverse in impacted soils that have become ‘dispersed’ and lost their structure. The sodium is being displaced, leached out, and replaced with calcium, re-flocculating the soil.”

REFERENCE

For a comprehensive tutorial by Dr. Jim Walworth from the University of Arizona on these issues (including the importance of quality of irrigation water on soil and the impact of calcium and sodium in influencing soil structure), see his fascinating PowerPoint:

J. L. Walworth, Ph.D. (2006). Soil Structure: The Roles of Sodium and Salts. University of Arizona Cooperative Extension Publication, University of Arizona, Tucson, AZ. <http://cals.arizona.edu/pubs> (then enter Publication Number az1414).

Water Surface Tension Comparison

Water from tomato grower in Mexico, August 2008



FRE-FLO™
treated water



Non FRE-FLO™
treated water.



The exact same amount of water (100 micro liters) was used on each slide, from the same water supply, at the same time. Test results show FRE-FLO™ technology produces reduced water surface tension, allowing the same amount of water to spread out more fully, over a wider area (shown in the left photo above). The reduced water surface tension has the advantage of allowing FRE-FLO™ water to better penetrate the soil surface in irrigation applications, to percolate into soil and wet the root zones faster. Thus, FRE-FLO™ water is used more effectively (instead of evaporating off the soil surface or becoming wasteful run-off). Results: more water and nutrients hydrate the soil and turf, reducing water usage and saving \$\$\$.

TOMATO PLANTS IN BAJA, MEXICO

FRE-FLO™ Treated Water



Untreated Water



CUCUMBERS IN BAJA, MEXICO

FRE-FLO™
Treated Water



Untreated
Water

FRE-FLO™
Conditioning Water Naturally



Since 1972

FRE-FLO™ WATER CONDITIONING TECHNOLOGY

Produced 38% Increase in Strawberry Nutrients

By Jim Stewart, PhD

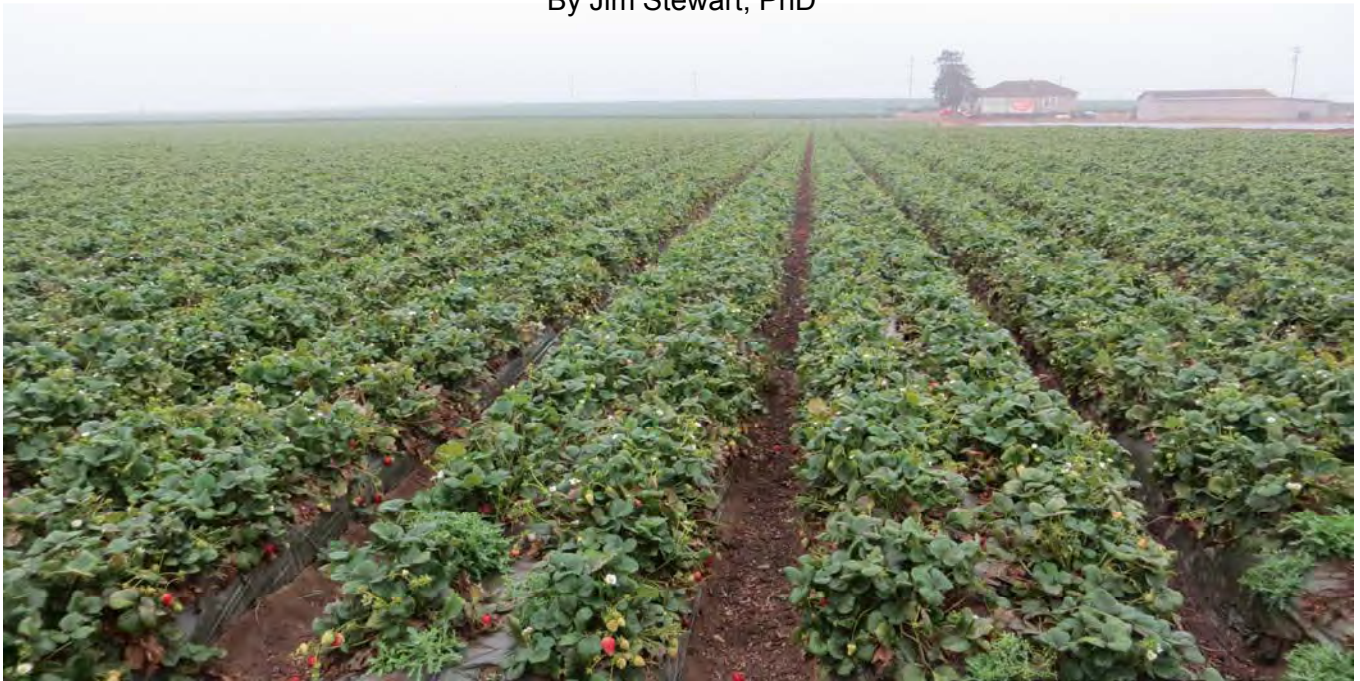


Photo of FRE-FLO™ Strawberry Research Site in California

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FRE-FLO™ WATER CONDITIONING TECHNOLOGY

Produced 38% Increase in Strawberry Nutrients

By Jim Stewart, PhD

SUMMARY: Treating the irrigation water on a strawberry field with a FRE-FLO™ water conditioning unit resulted in a significant 38% increase in nutrient content in strawberries in a side-by-side comparison to strawberries grown with untreated water. The brix sweetness level was a significant 16% higher in the treated berries. In addition, FRE-FLO™ improved water management by reducing water puddling and increasing percolation.

Methodology: A FRE-FLO™ water conditioning unit was installed on an irrigation system for strawberries in Moss Landing, California. A side-by-side field test was done for strawberries grown without the FRE-FLO™ water, but using the same water source. An independent laboratory did analyses of both FRE-FLO™ and non-FRE-FLO™ strawberries and leaves on October 27, 2013. Photographs of both fields were taken after irrigation on October 24, 2013.

Nutrition Results: The independent lab analysis shows a significant average 38% increase in beneficial nutrients in the strawberries grown with FRE-FLO™.

Average 38% Increase in Nutrient Levels Comparing FRE-FLO™ Treated Fruit with Untreated

<u>Strawberry Fruit Analysis</u>		%N Nitrogen	%P Phosphorus	%K Potassium	%Mg Magnesium	%Ca Calcium	%S Sulfur	%Zn Zinc	ppm Mn Manganese	ppm Cu Copper	ppm Fe Iron	ppm B Boron
Treatment	Date											
FRE-FLO™	10/9/13	1.13	0.31	1.91	0.17	0.31	0.12	21.73	64.5	4.8	75.1	25
Untreated	10/9/13	1.04	0.27	1.73	0.15	0.27	0.1	15.46	51	3.5	23.1	23.8
		0.09	0.04	0.18	0.02	0.04	0.02	6.27	13.5	1.3	52	1.2
Comparison %		9%	15%	10%	13%	15%	20%	41%	26%	37%	225%	5%
Data supplied by Independent Lab and analyzed by Alan James, PhD of Mid Valley Agricultural Services, Inc.												

Note that all nutrient levels are higher in the FRE-FLO™ treated fruit compared to the untreated phosphorous, strawberries. These manganese, include copper, improvements sulfur, nitrogen, in the boron, levels zinc. of The potassium, uptake in magnesium, trace metals iron, (manganese, copper, iron and boron) is especially important since they are most likely incorporated into bio-compounds that make them much more available to

the human body. Consulting Agronomist Allan James, Ph.D. has pointed out that the 15% increase in calcium in the FRE-FLO™ strawberries is especially noteworthy, because strawberry growers typically have difficulty improving calcium content in strawberry fruit. Instead, the calcium in the soil and water in strawberry crop fields usually goes to the strawberry leaves and is thus unavailable to consumers.

Leaf Analysis: The following chart demonstrates this potential FRE-FLO™ advantage. For example, the calcium and magnesium content decreased in the FRE-FLO™ strawberry leaves, perhaps because they instead enriched the fruit itself, as observed in the nutrition chart above.

<u>Strawberry Leaf Analysis</u>		%N Nitrogen	%P Phosphorus	%K Potassium	%Mg Magnesium	%Ca Calcium	%S Sulfur	%Zn Zinc	ppm Mn Manganese	ppm Cu Copper	ppm Fe Iron	ppm B Boron
Treatment	Date											
FRE-FLO™	9/19/13	3.08	0.46	1.6	0.29	0.93	0.21	20.6	181.6	4	104.1	78.4
Untreated	9/19/13	3.28	0.45	1.62	0.33	1.19	0.2	17.96	196.2	3.4	112.6	72.9
		-0.2	0.01	-0.02	-0.04	-0.26	0.01	2.64	-14.6	0.6	-8.5	5.5
Comparison %		-6%	2%	-1%	-12%	-22%	5%	15%	-7%	18%	-8%	8%

Improved Percolation:

The photo on the left from the control (non-FRE-FLO™) strawberry field shows a lot of water “puddling” on the surface, but almost none on the FRE-FLO™ side on the right. Although not visible in the picture, it was observed that algae was growing in the puddles on the control side. In addition there was more weed growth. Our representative stated, “On the non-FRE-FLO™ side, because of the frequent flooding of irrigation water on the surface, and therefore poor water drainage, weeds were able to take hold and grow. I observed many weeds on the non-FRE-FLO™ side, compared to almost no weed growth on the FRE-FLO™ side. The FRE-FLO™ water was percolating into the ground faster, able to go deeply to the crop root system, leaving the soil surface dryer. The soil surface is where weeds tend to take hold, with their shallow root system able to develop where water ‘puddles’ on the soil surface.”



Control (non-FRE-FLO™)



FRE-FLO™

Brix Results: A brix sweetness test conducted on October 8, 2013 showed the following results. The control berries tested at about 9.5 brix and the FRE-FLO™ berries tested substantially higher at 11 brix, for an increase of 16% which could increase the sale value of the crop.

Scientific Basis for Results: FRE-FLO™ water technology uses a catalytic process to change a portion of the dissolved calcium carbonate (that creates scale deposits in soil pores and in irrigation equipment) into suspended microcrystals. This elimination of scale (also called “hard pan”) allows the irrigation water to flow freely through soil pores and water-using equipment, bringing the nutrients directly to the roots. This eliminates “puddling” on soil surfaces, so that less water is lost to evaporation. The result, as many FRE-FLO™ users have found, is plants grow better on less water — resulting in better water management and lower water bills. In addition, plants grow faster and healthier producing higher value crops, and increased grower profits.



Research site data supplied by Owner and Independent Lab and analyzed by Allan James, PhD of Mid Valley Agricultural Services, Inc., Jim Stewart, PhD, Dorothy Malmstrom Lakeman, PhD, C. David Lakeman, John Heiny, and Bill Wilson



Ten (10) Limited Year Warranty For The FRE-FLO™ Stainless Steel Water Conditioning Units

FRE-FLO™ welcomes you to our family of satisfied customers.

Founded in 1972, FRE-FLO™ has continued to grow on a foundation of service and performance. To establish a long-term relationship with you, our valued customer, the following FRE-FLO™ Water Conditioning Unit Warranty is offered.

10 Year Limited Warranty of Materials and Workmanship

FRE-FLO WATER SYSTEMS, INC., manufacturer of the FRE-FLO™ Catalytic Water Conditioning Unit, warrants to the original purchaser that the unit will be free from defects in materials and/or workmanship for a period of ten (10) years following the date of purchase. Under no circumstances shall FRE-FLO™ be responsible for post-purchase damage to the unit, including damage caused by abuse, misuse, improper installation, or improper cleaning.

The responsibility of FRE-FLO™ under this limited warranty shall be limited to the repair or replacement of the unit upon receipt of said unit or, at the sole discretion of FRE-FLO™, to refund all or part of the purchase price of the unit (not including any installation, re-installation, labor, or any removal costs, or any shipping and handling costs).

To obtain performance under this warranty obligation, the purchaser must return the FRE-FLO™ unit, postage prepaid to the place of purchase or, after calling and obtaining a Return Material Authorization (RMA) number and shipping instructions, directly to FRE-FLO™, enclosing the original proof of purchase document. All packages returned to FRE-FLO™ without the original proof of purchase document and an RMA number clearly printed on the outside front of the return packaging will be refused.

Exclusions, Limitations

Exclusions include serviceable parts, such as O-rings and spacers. It is the responsibility of the customer to provide timely inspection of the FRE-FLO™ and to clean as necessary as outlined in the document "*Installation and Servicing Instructions with Specifications for the FRE-FLO™ Water Conditioner*". This warranty is void if the unit is cleaned mechanically by any means including, but not limited to: sand blast, bead blast, wire wheel or tumbled. There are no other warranties, implied or oral.

FRE-FLO™ has established a history since 1972 of unequalled performance. When the FRE-FLO™ Water Conditioning Unit is both sized properly and kept clean, and is used in water containing some of the worldwide mineral calcium carbonate, we are pleased to have found from decades of experience that it works efficiently.

www.freflowater.com

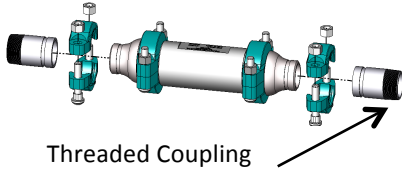
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FRE-FLO WATER SYSTEMS, INC.

FRE-FLO™ Conditioning Water Naturally Since 1972

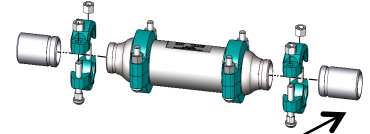
Engineering and Manufacturing Specifications



Threaded Coupling



First Five (5) Sizes of FRE-FLOs™



Welded Coupling

Model # (Stainless Steel Housing)	Water Flow Range GPM	Water Flow Range LPM	Connection Female NPT	Welded or Threaded Coupling	Length		Diameter	Weight in Lbs.	
					Welded Or Threaded	No Connector		With Connector	Without Connector
063-025 SS	0.1 to 1.1	0.4 to 4.2	1/4" NPT	NPT	6.48		0.88		0.80
100-050 SS	0.4 to 2.3	1.5 to 8.7	1/2" NPT	NPT	7.00		1.25		2.00
125-075 SS	2.2 to 4.7	8.3 to 17.8	3/4" NPT	NPT	7.77		1.50		2.20
150-100 SS	4.3 to 7.5	16 to 28	1" NPT	NPT	8.97		1.75		3.40
200-125 SS	7.3 to 16	28 to 61	1-1/4" NPT	NPT	12.58		2.25		7.60
<i>Note: When ordering, the units listed below come with an installation kit consisting of either a NPT, welded coupling or Victaulic connector. Please specify, so as to allow the installation to proceed as easily as possible. Other options available, please contact factory for quote. Please see picture above for standard connectors.</i>					Length		Dia. "	Weight in lbs.	
					Welded Or Threaded	No Connector		With Connector	Without Connector
250-150 SS (W or T)	15 to 35	57 to 132	1-1/2" NPT	Select W or T	25.2	17.2"	2.88"	25.0	17.0
300-200 SS (W or T)	36 to 53	136 to 201	2"	Select W or T	25.2"	17.2"	3.50"	27.5	37.0
400-250 SS (W or T)	50 to 108	189 to 409	2 1/2" NPT	Select W or T	26.15"	17.9"	4.5"	56.0	45.0
500-300 SS (W or T)	105 to 250	397 to 946	3" NPT	Select W or T	32.25"	22.0"	5.62"	90.0	75.0
800-400 SS	240 to 594	908 to 2,249	4.0"	4" W	40.0"	23.8"	8.62"	215.0	185.0
1000-600 SS	480 to 800	1,817 to 3,028	6.0"	6" W	43.35"	27.1"	10.75"	310.0	258.0
1000-800 SS	750 to 1,500	2,839 to 5,678	8.0"	8" W	57.85"	41.6"	10.75"	420.0	502.0
1400-1000 SS	1,500 to 2,500	5,678 to 9,464	10.0"	10" W	59.75"	43.5"	14.00"	670.0	580.0
1400-1200 SS	2,500 to 4,500	9,464 to 17,034	12.0"	12" W	82.75"	66.5"	14.00"	1,039.0	930.0

Note that the most important key to FRE-FLO's™ documented reliable performance is in selecting the correct size FRE-FLO™, which is based only on the gallons or liters per minute (GPM or LPM) of water flowing into the FRE-FLO™. The water flow may start and stop as required. However, when the water is flowing, it needs to be in the range of the model FRE-FLO™ selected.

Option: Some installations may require or it is desirable to have flanges rather than treaded or welded connections. While there will be an upcharge from the factory, this is an option we will gladly supply.