Fluid Dynamics
Hard water solutions since 1973

Irrigation and Plant Improvement

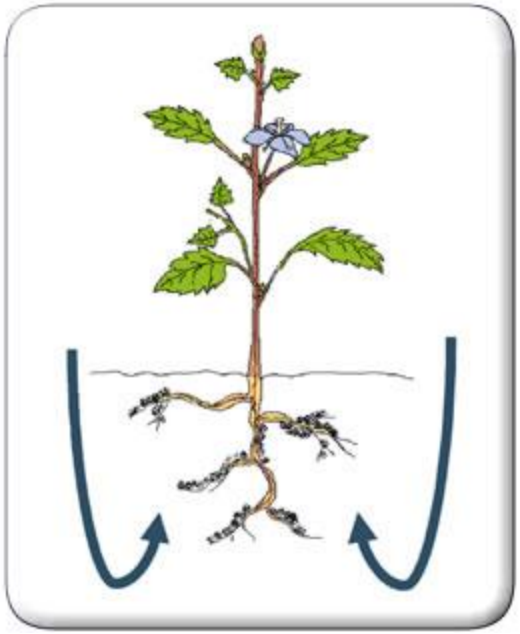
Maintaining efficient water delivery and enhancing plant growth in water based irrigation systems

Enhancing Plant Growth

Vital nutrients for plant growth include calcium and magnesium carbonate. However, in its calcite form these salts, rather than being ingested by the plants, tend to stick to the roots in the form of scum. Over time this will prevent effective ingestion of water carrying these minerals to feed the plants.

When irrigation is used intensively due to a lack of rainwater growers will notice the plants change color due to under nourishment.

When the rain returns the rainwater is under saturated with mineral salts. Rainwater does not carry these mineral salts and as a consequence washes the roots clean of this scum allowing them to re-ingest mineral salts at a more effective rate.



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Enhancing Plant Growth

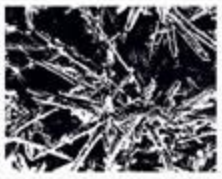
How does Fluid Dynamics treatment improve plant growth?

It's simple, once water is treated calcium takes on a colloidal crystal form which is easier for the plant to ingest and scum does not build up on the roots.

This has been proved in a preliminary university study carried out by the Middle Tennessee University using two species and four treatments (overhead watering or watering at the base of the plants, with or without the Fluid Dynamics catalytic unit installed).

The plants being watered with the Fluid Dynamics catalytic unit were noticeably larger after several weeks.

Following this study research has been commissioned to determine the extent of the benefits Fluid Dynamics treated water can offer growers.



Untreated calcium carbonate shown here in its calcite state

Treated calcium carbonate in its colloidal crystal state

Communication from Middle Tennessee State University

We ran a preliminary study with the Fluid Dynamics unit that you left with us. We used two species (Basil and Fescue) and four treatments (overhead watering or watering at the base of the plants, with or without the Fluid Dynamics unit installed). The plants being watered with the Fluid Dynamics unit were noticeably larger after several weeks. My student worker destroyed the plant materials while cleaning, so I didn't get any dry weight measurements or any other data. However, I do believe that I have photos showing the size differences.

In any case, these preliminary trials provide me with some rationale to investigate this further. I'm leaning towards doing a larger study in conjunction with my floriculture class this fall semester.

Following that, I will be able to provide you with some actual results.

I will keep you updated as we proceed.

Nate Phillips, PhD
School of Agribusiness and Agriscience
Middle Tennessee State University
Campus box 5
Murfreesboro, TN 37132

MIDDLE TENNESSEE STATE UNIVERSITY

Problems Facing Irrigation Systems

Large scale irrigation systems rely on borehole or well water for its rich mineral content and stable pH range. This water contains a high level of calcium and magnesium salts which are essential for successful plant growth. Water with high mineral content otherwise known as hard water will pose a number of problems to the cost and efficiency of the irrigation system if left untreated in the form of scale.

One area where scale will cause a problem is deposition inside the main feed pipes. Particularly hard water will see a steady build up of scale inside the pipe. This causes a reduction in water delivery, increasing the workload on the pumps. Furthermore scale can also contribute to corrosion of the pipe itself.

Scale build up will also affect the nozzles themselves. Water delivery is slowly reduced until the nozzle becomes completely blocked and requires cleaning. Each nozzle has to be manually dismantled and cleaned using sharp implements and chemicals which damage the nozzles. After several cleans the nozzles require replacing. Altogether this adds a significant cost to the operational cost of the irrigation system.

Clogged Nozzle

Clear Nozzle

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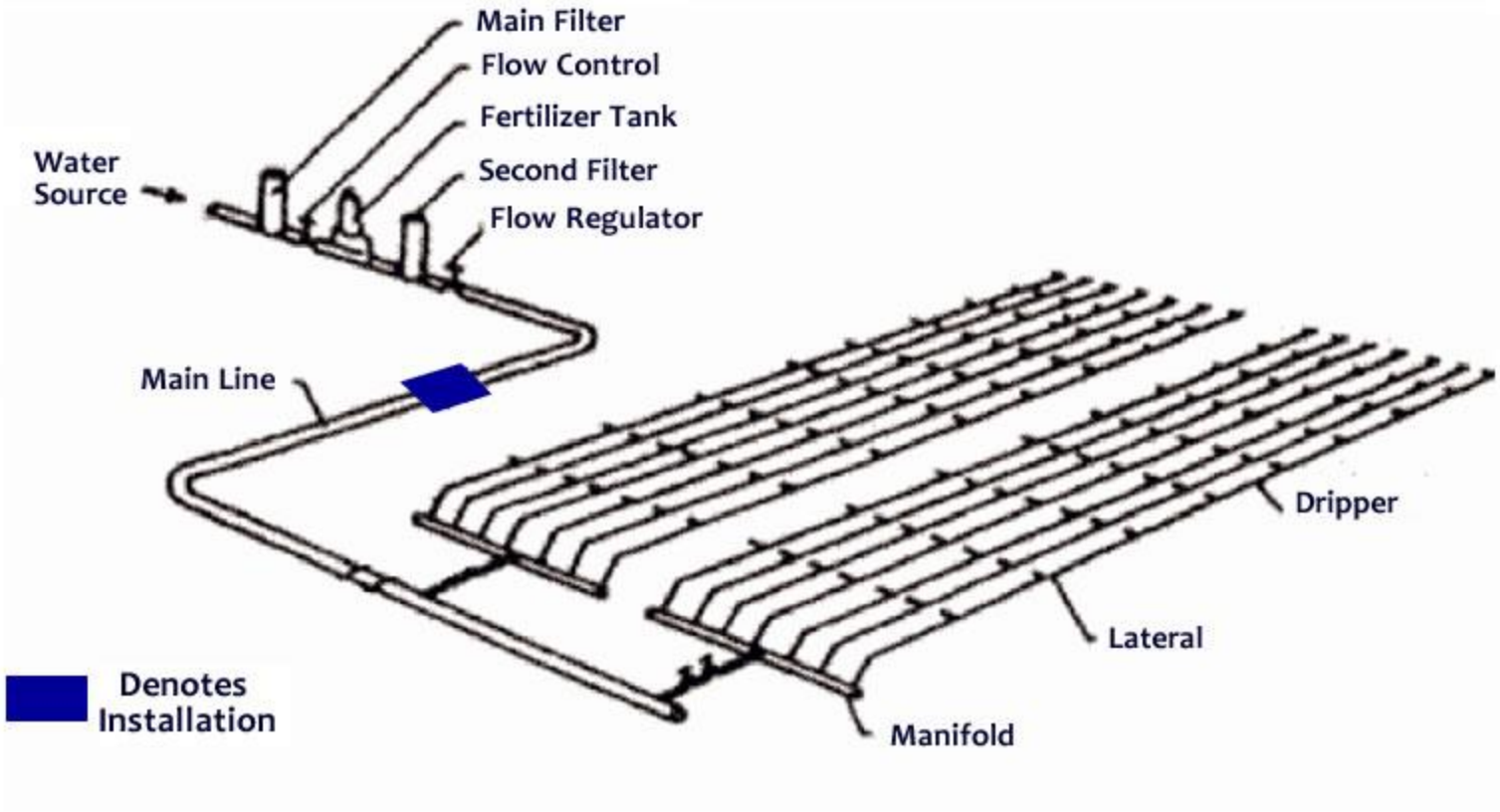
The Fluid Dynamics Solution

For over 35 years Fluid Dynamics has supplied their non-chemical water treatment equipment worldwide for the prevention of scale deposition in a wide range of water systems. Our products use no chemicals, require no maintenance and once water is treated it is totally safe for human or plant consumption.

Fluid Dynamics products utilize specially formulated components which react with the water as it passes through the equipment (see example to the right). This reaction targets calcium carbonate ($CaCo_3$), the main bonding ingredient in scale formation, altering it to a crystal structure which does not have the capability to stick to surfaces such as metal pipes. Once altered the calcium carbonate remains in a crystal suspension in the water until it is absorbed by plants.

A recent installation on a center pivot irrigation system in Texas

A Simple Installation



Simple Installation

All Fluid Dynamics water treatment equipment is simple to install. Up to 3.5 feet in length it will replace a section of the existing main line pipe work and is connected using flanges or simple fittings.

Equipment can be installed in remote locations as there are no power requirements and no maintenance is required.

Equipment must be sized according to flow rate.

Typical return on investment is within 5 months.

NOM BORE	INCH	2.5"	3"	4"	5"	6"	8"	10"	12"
	MM	65	80	100	125	150	200	250	300
LENGTH	INCH	36	36	36	36	36	36	36	36
	MM	913	913	913	913	913	913	913	913
	m3 p/hr	18 -29	25 - 54	45 - 80	75 - 145	120 - 270	225 - 440	360 - 650	550 -750
	ltr/sec	5 - 8	7 - 15	12.5 - 22	21 - 40	33 - 75	62.5 - 122	100 - 180	155 - 210
	usgal/min	80 - 127	111 - 238	200 - 350	330 - 635	530 - 1190	990 - 1930	1585 - 2850	2450 - 3300

Irrigation Application Form

Matching the appropriate Fluid Dynamics solution to the application is a simple process requiring information about the system and water tests.

Water Analysis Requirements:

System Make Up (Prior to filtration or nutrient dosing)

M-Alkalinity	
Chlorides	
Sulphates	
Total Hardness	
Calcium Hardness	
Ph	
Total Dissolved Solids	
Water Temperature	

Case Study: Amarillo Area Center for Advanced Learning , Amarillo ISD, Amarillo, TX

Category: Agricultural

Application: Greenhouse Systems

The Challenge:

The Amarillo Area Center for Advanced Learning needed a solution for the hard water scaling issues they were experiencing in their greenhouse. The cool cell filter for the greenhouse's cooling system had to be replaced every two weeks, the mist heads in the propagation tent required cleaning every few days and salt deposits were apparent on the plant cuttings. These issues impacted results and incurred costs for replacement parts and labor.

The Solution: On July 12, 2012, a ¾" Scaletron was installed in the greenhouse.

Plants with deposits prior to installation

Deposit free plants following installation

Results: The installation has been a great success with the customer noticing improvements within days. Cool cell filter life has been extended greatly and the mist heads have not required cleaning following an initial clean following the installation of the Scaletron.

Dealer Feedback:

I just came back from the greenhouse over at AACAL! The pictures are incredible and the testimony of Sheila, the lady who keeps the greenhouse, is amazing.

First of all, the excitement that she has for the product is wonderful. She is seeing a tremendous improvement in her plants and using half as much fertilizer. She takes watering cans of water into the building and waters the indoor plants and everyone in the school is seeing a remarkable improvement in the indoor plants. It has totally cleaned the cooler pads.

There is no way I can relay her enthusiasm about her "new" greenhouse. The whole appearance of the greenhouse has changed, it is cleaner and doesn't "feel" dirty and grungy!

She gave me a name of the person who is working at Carver Academy in their greenhouse. It is a foundation called Friends of Carver Academy; they take care of the plants at the school and are not affiliated with the school district.

Funny thing: when they first got our equipment her boss said, "Hopefully, this is not snake oil"! She now affectionately refers to "her" water as "snake water"! She kept saying snake water and finally I ask what the heck she was talking about, she then told me the story!! Fun lady!!

Sheila Brumley's official testimonial follows…

Evaporative cooling pad on June 25th, 2012

Evaporative cooling pad on September 19th, 2012

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US Case Study

AMARILLO INDEPENDENT SCHOOL DISTRICT

Plant Maintenance and Facility Construction 905 East Street Amarillo TX 79107

October 16, 2012

I am the greenhouse grower at AACAL, (Amarillo Area Center for Advanced Learning).

On July 12, 2012, a ¾" Scaletron was installed in the greenhouse. We needed a solution to the problem our water was causing with our cooling system. The cool cell filter had to be replaced every two weeks or less. The cool cell trough was so corroded it leaked forming "salt-sickles" down from the trough and up from the floor. The mist heads in the propagation tent would clog within days of cleaning and there was a "salt glaze" on the cuttings.

A few days after installation, I noticed how clear the water was. When the water hit the soil it was as if a surfactant was added. After a few more days the water pressure had increased. I used a few cool cell filters quickly as there were half inch chunks of scale coming from the water line and cool cell. I cleaned the propagation tent mist heads after installation. I have not had to clean them again. It appears cool cell filters will last a few months as opposed to two weeks. The water has dissolved the salt on the floor and hanging from the cool cell trough.

I was surprised how quickly the plants began to be affected by the water. The color and growth is so much better. The plants do not require as much water. I am using half the fertilizer I was before. A buildup on the soil, pots or drainage holes is gone.

Sheila Brumley
Amarillo Independent School District

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Summary

Fluid Dynamics offers inexpensive and robust environmentally friendly green solutions to eliminate hard water problems. With over 40 years in the business and over 400,000 units installed, all of our products are confidently

We look forward to working with you.