



Green Roofs Healthy Cities Update

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Green Roofs For Healthy Cities

Greening North America

Activity Update

What Is GRHC?

Organization

Green Roofs for Healthy Cities (GRHC) is a non-profit industry association working to promote the green roof and wall industry throughout North America.

Mission

GRHC's mission is to develop and protect the market by increasing the awareness of the economic, social, and environmental benefits of green roofs, green walls, and other forms of living architecture through education, advocacy, professional development and celebrations of excellence.



2017 Year in Review

Advocacy – Growing the Green Roof Pie

- Provided support to the Denver Green Roof Initiative helping to secure a November victory.
- Provided ongoing support of Portland's green roof requirement for new buildings.
- Advocated for green roof specific policy in King County, Portland, Seattle, and Vancouver.
- Supported San Francisco's new Better Roofs Ordinance.
- Provided support for a new Property Assessed Clean Energy (PACE) financing program for green roof design, installation and maintenance
- Facilitated a review of Toronto's Eco-Roof Incentive Program.
- Advocating for Low Impact Development Guidelines in Ontario.
- Rolled out the new Living Architecture Policy Library program to catalog green roof policy.
- Supported the ongoing development of Living Architecture New York.

2017 Year in Review

Market Development – Research, Standards, and Services

- Completed Version 1.0 of the Living Architecture Performance Tool after consultation. Allowing the LAPT to move into pilot project phase for 2018.
- Supported revisions to the ANSI/SPRI VF-1 Fire Design Standards for Vegetative Roofs.
- Expanded the Journal of Living Architecture, the peer reviewed scientific publication in the Living Architecture Monitor.

Market Development - Events - Symposium

GRHC Symposium Program

Local market development program held in emerging markets.

Event held to advocate for local green roof and wall policy adoption.

One-day events featuring presentations, panel discussions, and a trade show.

Engages 30-60 local stakeholders, government employees, and educators.



2018 Symposia Cities

Houston, TX
• October 22, 2018
Indianapolis, IN
• June 8, 2018

Vancouver, BC
• October 2018
Washington, DC
• May 2018

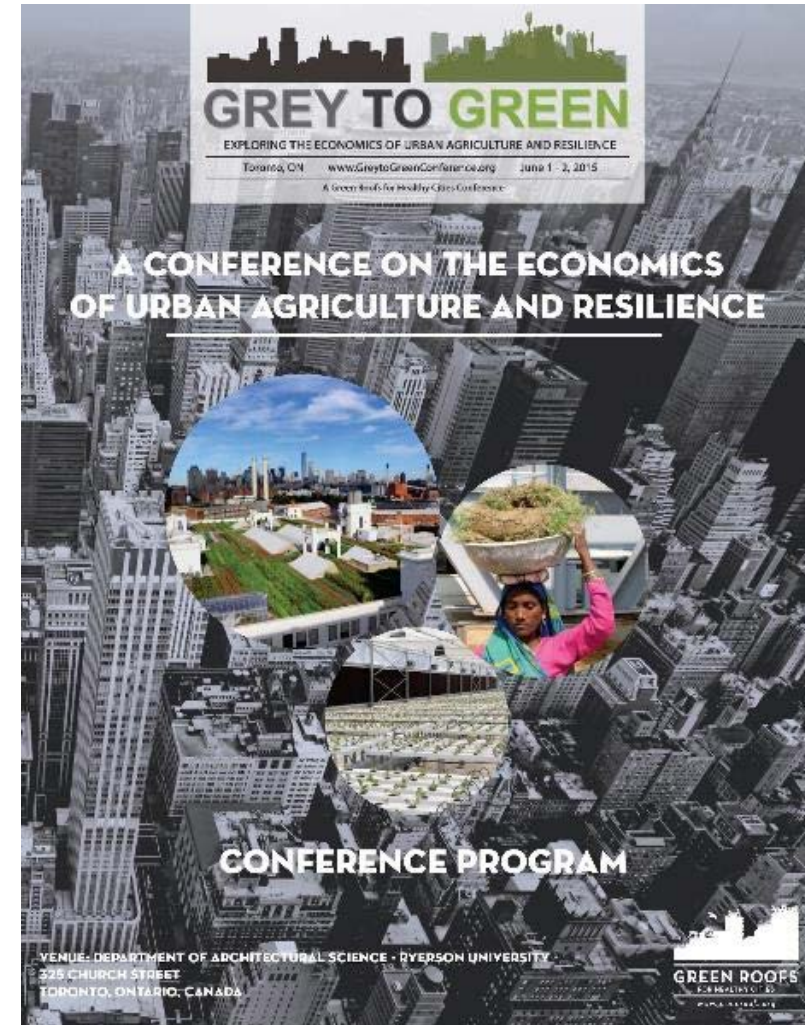
Market Development - Events

Grey to Green

Grey to Green

Focus on smaller scale green infrastructure implementation at a urban and regional level.

Engages 300-400 professionals, students, non-profits, government representatives, educators, and consumers.



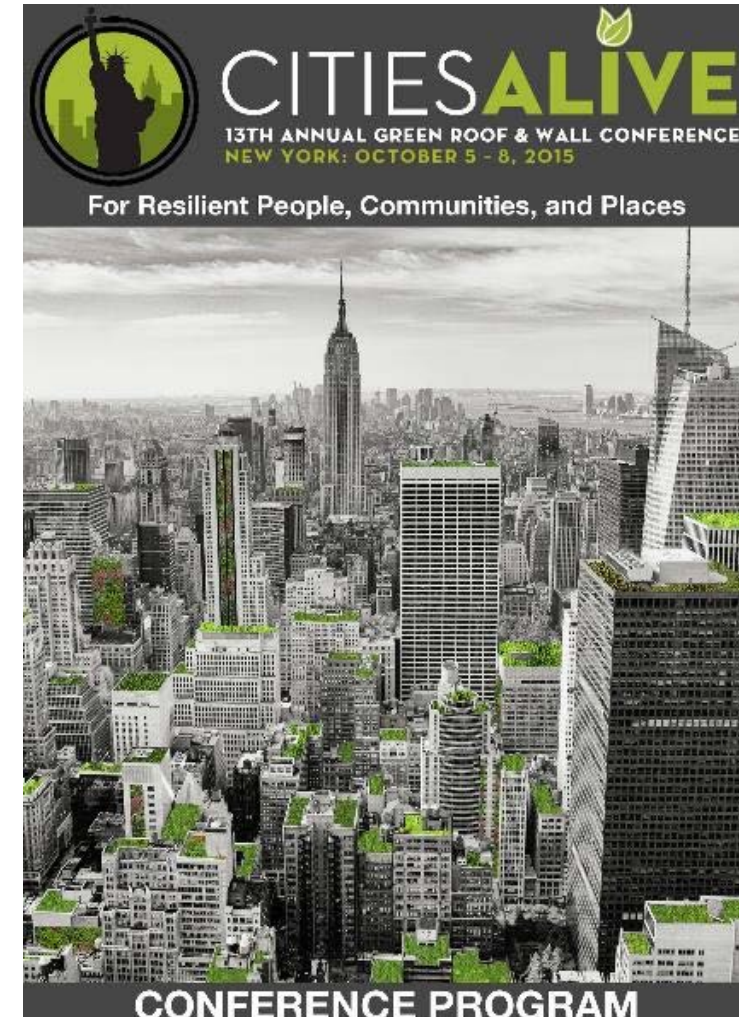
Market Development - Events

CitiesAlive

CitiesAlive

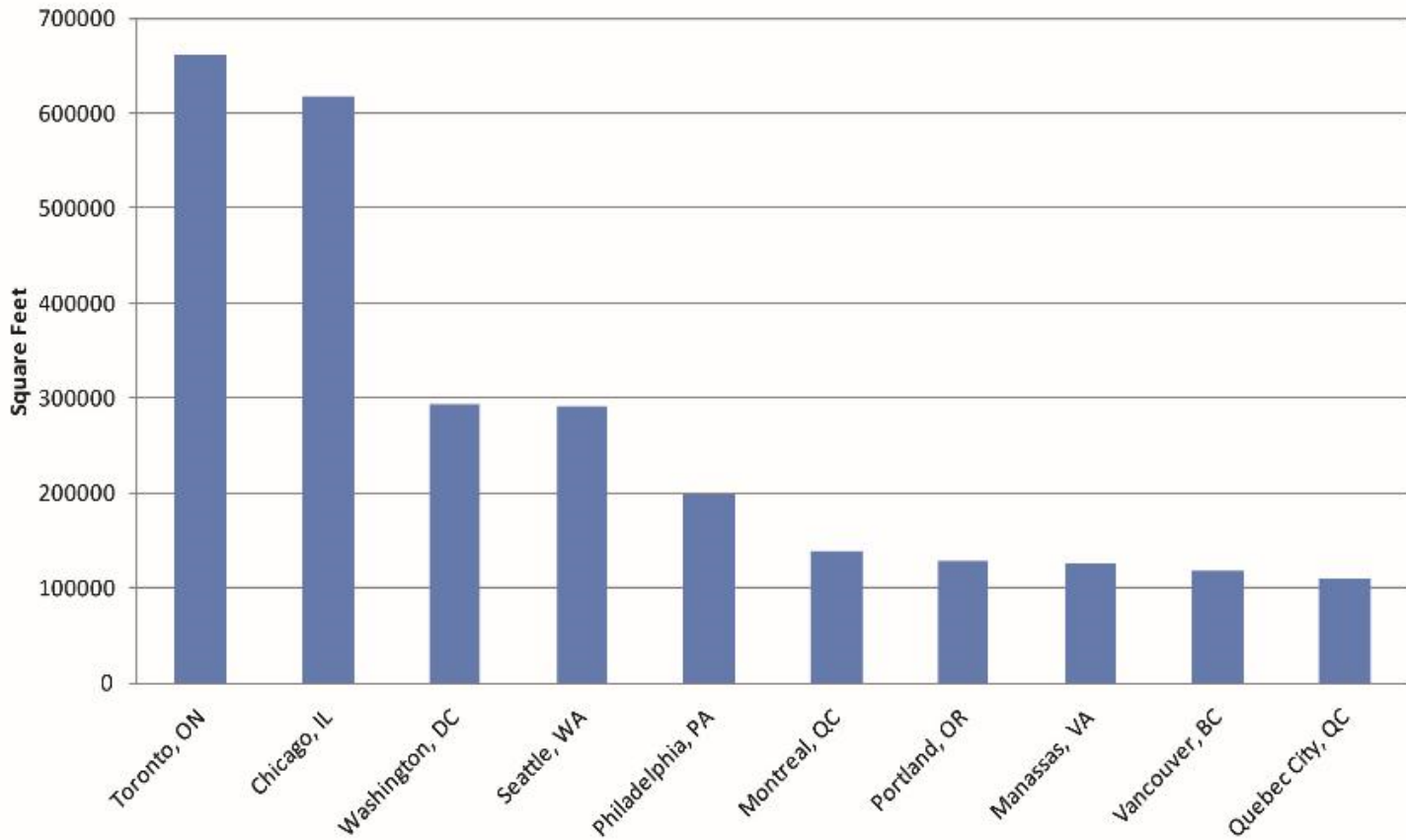
Annual national green roof & wall conference held in major markets across North America

CitiesAlive 2017 will be held **September 24-27** focusing on building resilience and equity in New York City.



Market Development - Survey

Green Roof Installation by Metropolitan Region



Green Roofs for Healthy Cities, 2016

Annual green roof industry snapshot and strategic analysis.

2017 Green Roof Market Survey report, demonstrating a 10% estimated growth in 2016 over 2015.

Market Development - Training

Training program that provides the most comprehensive, holistic approach to green roof and wall design, installation and maintenance available in North America.

Green Roof Professionals (GRP) are able to maximize the benefits of green roofs during the design process, recommend green roof options, and address the major challenges and best practices associated with design, management, installation and maintenance.

Online **GRP Training** and **Net Zero Water** offered online on-demand.



Market Development - Green Infrastructure Foundation (GIF)



Independent charitable 501(c)(3) arm of Green Roofs for Healthy Cities

Responds to the need for greater awareness and resources to promote green infrastructure in local communities.

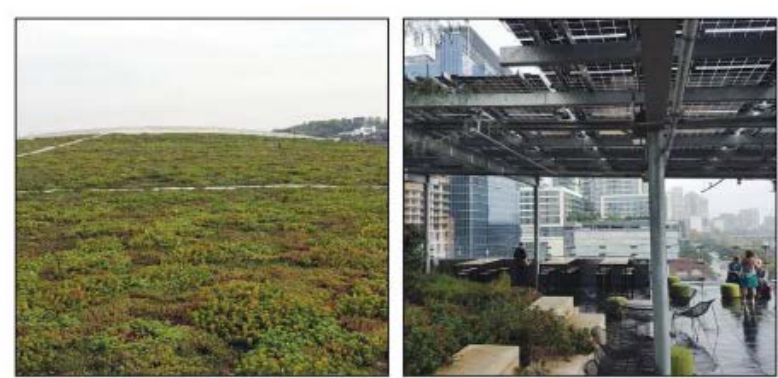
Designs programs, activities, and research designed to promote the positive contributions green infrastructure can make in communities.

Involved in long term GRHC activities such as research.



Market Development - GIF

Living Architecture Performance Tool



LIVING ARCHITECTURE PERFORMANCE TOOL

Draft
Version 1.0



Goals of LAPT are to grow the industry by establishing performance based metric for green roofs and eventually green walls not unlike what LEED did for green buildings

Entered the pilot phase in 2018.

- Seeking 25 participants to pilot the rating system throughout 2018

Rohan Lilauwala, Senior Researcher for details -
rlilauwala@greenroofs.org

Market Development - GIF

Green Infrastructure Charrette

The goal of this program is to explore costs and benefits of green infrastructure on an aggregate scale and engaging policy makers, designers and community groups in the reimagining of a neighborhood or region.

Full day design charrette involving the re-envisioning of communities with living green infrastructure.

Green Infrastructure Cost-Benefit Matrix developed by Green Roofs for Healthy Cities to analyze cost/benefit factors.

Summary reports and matrix data made available to participants and clients.





Brian Vinchesi



Inspections, Evaluations, Audits and Commissioning



Is this a better order?

Evaluations

Audits

Inspections

Commissioning

DOES THE NOMENCLATURE MATTER OR IS IT JUST
ALL THE SAME AND A MATTER OF SEMANTICS?



EVALUATIONS





AUDITS





INSPECTIONS





COMMISSIONING





Darin Brasch



Fertigation

Proving that Doing More with Less is possible.....



Contents

Intro & Background

Benefits

Types of injection

Equipment Options

Delivery Method

Products Selection and Application

ROI

Summary



What is Fertigation?

FERTIGATION is the application of fertilizer and other amendments through the irrigation system
(**FERT**-ilizer & irr-**IGATION**)

“Independent studies have proven that Fertigation is the most efficient way of feeding all types of plant material and turf by providing superior nutrient uptake for better plant health and eliminating the negative environmental affects created by traditional fertilization methods.”



FERTIGATION is not a new technology

- **Households have been implementing the simplest form of when feeding with a hose end sprayer**
- **Growers have been using for more than 70 years to decrease labor and improve crop yields.**
- **Golf Courses throughout the world have been using for the past 30 - 40 years to deliver fertilizer and wetting agents.**



CHEMIGATION

CHEMIGATION is the application of chemicals through the irrigation system
(**CHEM**-ical & *irr*-IGATION)

CHEMIGATION

A broader term which includes fertilizers but also allows for non plant food products

**FERTIGATION & CHEMIGATION
are both forms of injection**



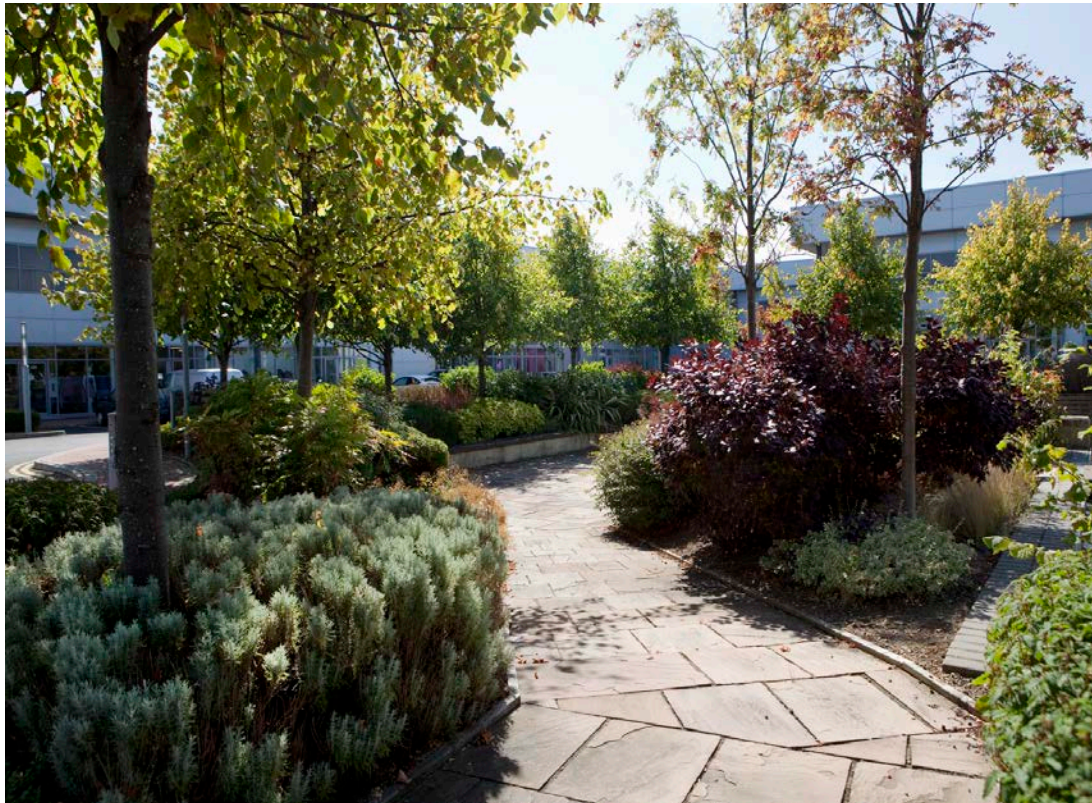
The Benefits of Fertigation



- **Feed directly through all types of irrigation**
- **Reduce application labor**
- **Eliminate Run-Off**
- **Reduce Pesticide Needs**
- **Controlled Growth**
- **Enhanced product availability**



Benefits



- **Non invasive approach**
- **Complete fertility and water management**
- **Maintain irrigation systems**
- **Water Savings 10%-30%**



Benefits



- **Fertigation provides Nutrient absorption of 90% or more compared to 10% using dry products**
-Congress of the United States, Research and Development Subcommittee of the Joint Committee on Atomic Energy
- **Plant health improved 30% to 50%**
-Clemson University, 2001-2003
- **Continual nourishment creates superior root mass and depth and provides better water and nutrient absorption**
-The University of Arizona, 2000
-Golf Course Management, 1998
- **Dry fertilization creates a feast and famine feeding cycle which causes root damage, making plants more susceptible to disease and insect infestation**
-Lawn and Landscape Magazine, 1998



Benefits

- A study conducted by **Clemson University** confirmed that when a major rain occurs, periodic applications of dry fertilizer will result in a portion of the fertilizer being absorbed in one big dose and the rest will wash away.
- According to an article from the **Scripps Howard News Service**, “when lawns get more nitrogen than they can absorb, excess nitrogen migrates into the watershed, stimulating algae growth in local ponds and bays that suffocates fish and aquatic life.” Pittsburgh Post-Gazette, [Scripps Howard News Service](#). 6 April 2002.





Benefits



Over Five Billion dollars could be saved today

Better fertilization techniques not only positively affects our potable water supply, they can also dramatically affect our energy consumption.

“A 50% reduction in fertilizer used would save the United States \$2.9 Billion in annual energy costs” - US Geological Survey, 2000

At Time of Quote: \$1.56 per gallon unleaded

Just over \$30 a barrel in 2000

Current Prices: \$2.65 per gallon unleaded

Just under \$50 a barrel 2017



Benefits

Shoestring Acacia Before and after Fertigation



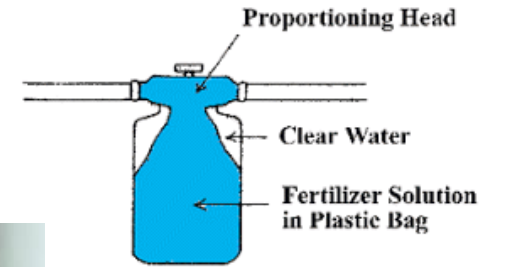
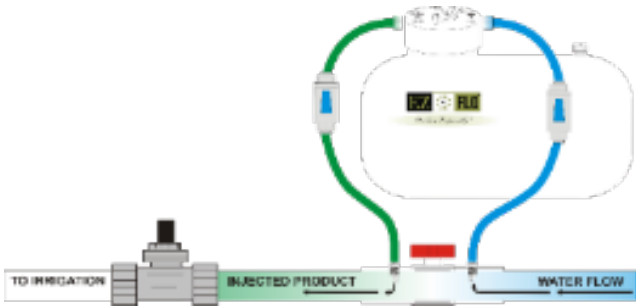


Types of Injection

- **There are two basic types of injection processes**
- **Differential Pressure**
 - Bladder, Venturi, Dynamic Suspension, Water Driven Pumps
 - Simple, Low cost, Varying levels of sophistication
- **Pump Systems**
 - Electrical pressure producing
 - Complex, Accurate, Wide variance in price



Types of Injection





Injection Systems vary by design

- Some systems **require electricity**
- Some systems **are very complex** and expensive
- Some **require drains** for exhaust water after every injection
- Some **require programming** for specific injection rates to each zone
- Some **require specific fertilizers** or void the warranty
- Some **require pre-diluting** water soluble product
- Some **only** work with **liquids**
- Some **adjust automatically** to pressure and flow
- Some work with **any water soluble or concentrated liquid** products
- Some offer the **ability to feed a percentage of the run time**
- Some systems are **mechanical** and require technical maintenance
- Some systems have **no moving parts** at all



Back Flow Protection

- Any Injection System must have an approved back flow prevention device installed.
- Either an RPZ or a PVB (***Always follow all local codes***)





Differential Pressure

- This Comprises a Broad Range of Simpler Injection Technologies
- Styles Discussed:
 - Basic differential pressure with limited control
 - Bladder systems using a physical membrane
 - Venturi systems with vacuum creation
 - Aspiration systems with dynamic fluid mixing controls
 - Water driven mechanical pumps



Differential Pressure Basic Systems

- The simplest form of injection available
- May be used with a wide variety of products
- Will operate at low pressure and flow
- Options for Hose Bib, Irrigation Mainline, & AG based irrigation
- Average Cost Range: \$10 to \$2500





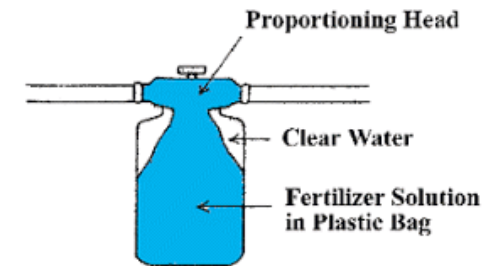
Differential Pressure Basic Systems

- **Important Considerations:**
 - Poor/Limited injection rate control
 - Low accuracy
 - Limited in capacity
 - Limited product selection
 - Cannot adjust to varying flow



Differential Pressure Bladder Systems

- A simple low cost form of injection
- Can only be used with liquid products
- Will operate at low pressures and flow
- Improved accuracy over basic differential pressure system
- Options for Hose Bib, Irrigation Mainline
- Average Cost Range: \$100 to \$500





Differential Pressure Bladder Systems

- **Important Considerations:**

- Limited injection rate control
- Reduced product availability
- Cannot adjust to pressure and flow variance with accuracy
- Bladders prone to wear and lose accuracy when holes develop
- Limited in capacity



Differential Pressure Venturi Systems

- Improved accuracy
- Can inject strong acids
- Can be attached to large storage tanks
- Options for Hose Bib & Irrigation Mainline
- Ideal for AG and Grower applications
- Average Cost Range: \$20 to \$1500





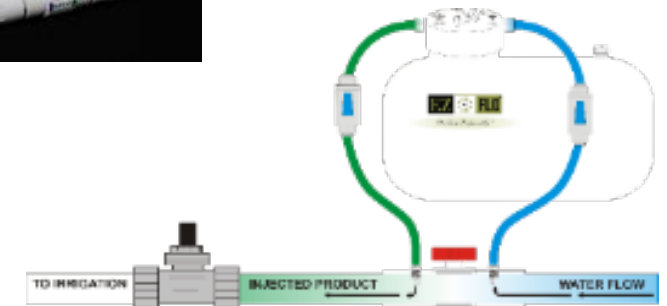
Differential Pressure Venturi Systems

- **Important Considerations:**
- Fast feed rate
- Products must be liquified prior to use
- Must be installed on a bypass due to the pressure loss
- Flow rate limitations and Pressure Limitations
- Must be manually calibrated to specific flow and pressure



Differential Pressure Dynamic Suspension

- Simple to operate
- Can be used with highly concentrated products
- Micro dosing capable, 75:1 to 1.5 mil:1
- Chemicals do not mix based on proprietary fluid flow technology
- Accurate proportioning
- Automatically adjust to pressure and flow





Differential Pressure Dynamic Suspension

- No mechanical components or electricity required
- Options for Hose Bib, Irrigation Mainline
- Ideal for multi zone applications where pressure and flow varies: Residential, Commercial, Schools, Parks, Golf
- Average Cost Range: \$35 to \$5500
- Wide operating range of 5 psi to 200 psi
- Mainline flow rates 5 GPH to 6000 GPM





Differential Pressure Dynamic Suspension

- **Important Considerations:**
- Tanks are pressurized with the main line pressure
- Products must have a specific gravity greater than or equal to 1.0



Differential Pressure Mechanical Pumps

- Low cost & Accurate form of injection
- Will adjust to pressure and flow
- High accuracy over basic differential pressure systems
- Can inject strong acids & livestock medications
- Can be attached to large storage tanks
- Ideal for AG and Grower applications
- Average Cost Range: \$175 to \$3500





Differential Pressure Mechanical Pumps

- **Important Considerations:**

- Fast feed rate
- Products must be diluted & liquified prior to use
- Must be installed on a bypass due to the pressure loss
- Flow rate limitations - Pressure range limitations
- Mechanical parts will wear over time
- The systems cannot run dry



Simple Electric Pump Systems

- Moderate cost of injection
- Excellent accuracy and injection options
- Can inject a wide variety of products
- Can be attached to large storage tanks
- Ideal for AG & Grower applications
- Average Cost Range: \$250 to \$15000





Simple Electric Pump Systems

- **Important Considerations:**
- Products must be liquified prior to use
- Must be calibrated to specific flow and pressure
- Mechanical parts will wear over time
- High cost of purchase and complex set up
- Complex operation
- Large storage tanks required



Complex Electric Pump Systems

- Highest cost of injection
- Excellent accuracy and injection options
- Limitless capacity 100 to 10,000+ acres
- Can control pH and nutrients levels with automated real-time adjustment
- Ideal for large AG & Grower
- Average Cost Range: \$25,000 to \$250,000+





Complex Electric Pump Systems

- **Important Considerations:**
- Products must be liquified prior to use
- Mechanical parts will wear over time
- Highest cost of purchase
- Complex set up and operation
- Typically require separate structure
- Large storage tanks required



Delivery Method

FERTIGATION

- Must be delivered through a water source
- The type of water source and application will affect the type of system used
- All forms of irrigation can utilize Fertigation
- The efficiency of the irrigation system will directly affect the ability of the injection equipment and products
- The type of irrigated area and system will also determine the level of exposure





Delivery Method

- One system can feed every type of plant through every type of irrigation system automatically eliminating manual application labor hours.





Product Application & Selection

- **Products are the key to Successful Fertigation**
 - Organic or Synthetic, Liquid or Water Soluble Fertilizers
 - Acids, Calcium, Surfactants/Wetting Agents
 - Repellents
 - Sanitizing and Cleaning chemicals



Product Application & Selection

Before selecting products to apply consider the following

- Needs of the landscape and plants
- Capability of the irrigation system
- Specifics of the product to be applied
- Use high quality products
- Safety requirements of products



Return on Investment

Higher Initial Cost

The scope of the project will determine the cost of the equipment

- The size of the treated area will determine the size of the equipment
- Predetermined precision requirements
- Treatment solutions not previously addressed



Return on Investment

How Investment is Recovered

- Reduction in product input volume
- Reduction in plant loss
- Superior irrigation system performance
- Controlled management
- Faster germination and establishment
- Reduction in application labor
- Increased curb appeal
- Reduction in water usage



Summary

FERTIGATION

- **Reduces fertilizer run-off**
 - Increased nutrient uptake reduced bulk applied
- **Virtually eliminate transplant shock**
 - Better rooting and enhanced soil structure
- **Reduces eliminates exposure to chemicals**
 - Products are applied in small doses
 - Only what is needed is applied avoiding excess residuals
- **Creates Sustainable Landscapes**
 - Allows for simple implementation of organic and other sustainable practices



Summary

FERTIGATION

- **Eliminates application labor**
 - Acres may be treated from the water source in minutes
- **Applies multiple products at once**
 - Wetting agents, Fertilizers, Controls
- **Reduces water requirements**
 - Specialized inputs and enhanced root development
- **Improves plant health**
 - Eliminates feast and famine cycle

Summary

We all need to realize that we have an opportunity to make environmentally conscious choices in your designs.

FERTIGATION is one solution that gives you the opportunity to optimize your approach and increase efficiency of any irrigation system.

Providing more benefit to our industry, our environment, and your customer and their landscape investment.