



HyO TechnologiesTM

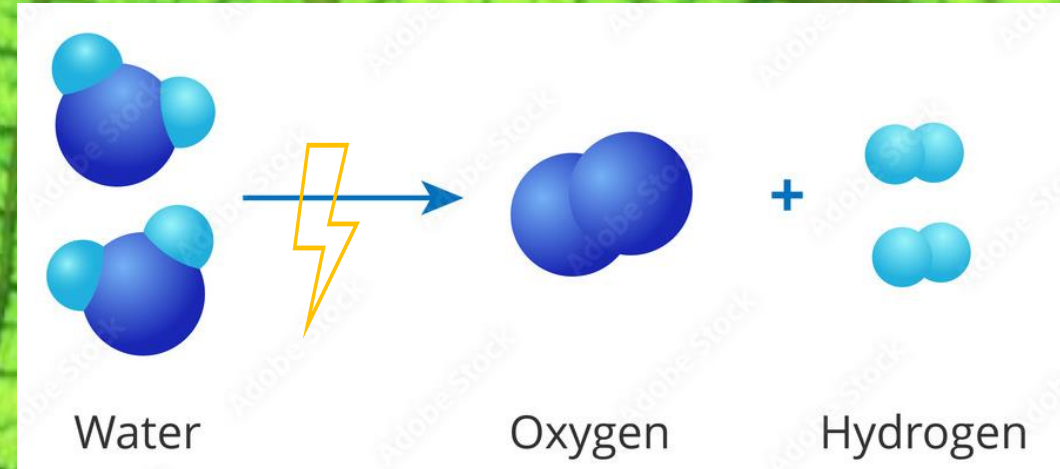
Our vision is to raise the expectations for growth, health and stamina of all crops and animals

Our mission is to sustainably improve food security and reduce waste, through the safe and targeted delivery of hydrogen and oxygen as essential nutrients



**Plant leaves naturally hydrolyze
water into hydrogen & oxygen during
photosynthesis**

**Using an existing irrigation line, HyO
electrically separates a fraction of
feed water into molecular hydrogen
and oxygen, with zero additives**





Bumper crops benefit from hydrogen created during a well-timed lightning storm

Hydrogen is present in the air surrounding a lightning bolt, where it can dissolve into raindrops and be delivered to the ground

HyO creates “lightning on demand”, delivering molecular H and O like any other nutrient



17 Essential Amendments

A Primer on the Benefits of Hydrogen and Oxygen in Agriculture

HyO allows for the simple addition of essential Hydrogen and Oxygen ‘on demand’ through existing irrigation water supply lines

Hydrogen, carbon and oxygen are non-fertilizer ‘essential’ macronutrients

- Indoor grow operations will not benefit from a ‘bumper crop’ since they do not receive hydrogen from thunderstorms
- Each of the other 14 nutrients are available by simple addition to the soil by way of fertilizers, but hydrogen and oxygen had never been available to add for potential higher yield, health and stamina of plants – until now

7 N Nitrogen	15 P Phosphorus	19 K Potassium	12 Mg Magnesium	16 S Sulfur	20 Ca Calcium		
Macronutrients			Secondary Nutrients				
5 B Boron	17 Cl Chlorine	25 Mn Manganese	26 Fe Iron	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	29 Mo Molybdenum
Micronutrients							
1 H Hydrogen	6 C Carbon		8 O Oxygen				
Non-Fertilizer Elements							

Image credit: www.ecosustain.com

Hydrogen becomes available via photosynthesis, as well as microbial and enzymatic activities in the soil

Carbon is derived from the air and the breakdown of organic matter, becoming available to the plant roots rhizosphere

Aeration practices help to get oxygen to the root's rhizosphere

HyO delivers 'lightning-on-demand' – whether for growing crops indoors or outdoors, for raising animals at an apiary or ranch, or for post-harvest preservation in wholesale or retail locations



How does molecular hydrogen impact cellular health?

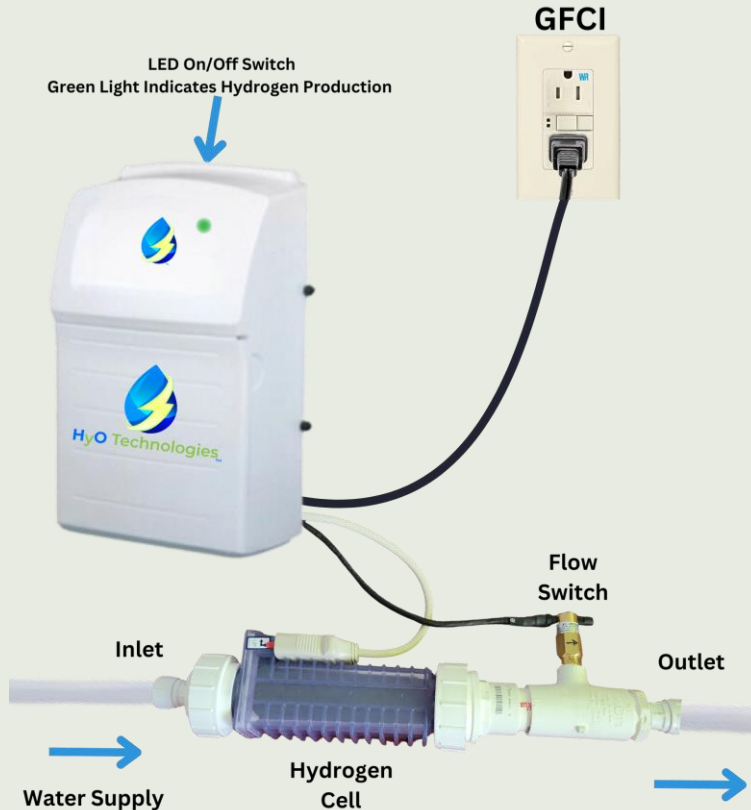


- Enables organisms to reduce and withstand stress longer and better while thriving
 - Modulates specific gene expression or signaling pathways, in animals and plants
 - Anti-stress, anti-inflammatory, anti-apoptotic responses with no detrimental side effects
 - Scavenges hydroxyl radicals to decrease oxidative stress in vivo
- Enables and optimizes energy production in cells
 - Increases cell energy available (mitochondria ATP production raised by >50%)
 - Reduces the production of reactive oxygen species

Link: [Hydrogen Biology - Hydrogen Biology Research Center](#)



How does the HyO system deliver molecular hydrogen?



- Water from an existing irrigation line will flow through the system, turning on the power to the hydrogen cells
- The bonds between oxygen and hydrogen in water are broken with sufficient power at the surface layer
- Existing irrigation water supply enhanced with “HyO Water” has led to **extraordinary results!**

Our team works with your head growers to get the most out of your HyO system, using our field knowledge to optimize for:

- System size, location, and layout
- Usage patterns
- Water quality, nutrient amendments, and disinfectants





Greenhouse tomatoes grown in South Dakota using HyO water yielded 300% more fruit than the control, while virtually eliminating blossom end rot





HyO water

**Lettuce greens grown in peat using
HyO water – with no soil effects –
produced 205% more weight than
the control after 30 days**



Control





Jalapeño peppers
were grown in 2023
at Texas A&M
University using
HyO water yielded
165% the weight of
the control sample
after 30 days





In the same Texas A&M University test, the Jalapeño peppers grown using HyO water produced 33% greater root length and 22% more root surface area



Pepper seed priming with HyO achieved faster germination rate



Raw Seed
36% Germination

Priming, 100 PPM fungicide in tap
water run through a HyO system
74% Germination

Priming, 100 PPM fungicide in RO Water
60% Germination (current best practice)

Day 14 Germination at 20/30°C, testing conducted by global seed producer per USDA guidance



Cannabis grown with HyO water (right) had a 159% increase in seed yield, 41% increase in CBD content, and much larger roots vs control



**“This was the largest harvest I have ever seen! Using HyO made a tremendous difference.”
- Cannabis Farmer (Michigan)**



Detailed method and results for cannabis testing by Colorado Hemp Services, Summer 2020

- Twenty nearly-identical hemp plants in size and growth structure were selected at week zero of flower growth, and hydrogen-rich water (HRW) was used on one plant of each hemp through the remainder of flower growth through harvest
- After harvesting/drying, five grams of flower was collected of each variety of CBD hemp
- Independent laboratory testing found that the HRW-treated hemp had substantially more CBD

Variety	Flower Week	Control CBD Content	HyO CBD Content	Difference
Ella Estrella	16	11.70%	11.98%	2.39%
Bessemer Bush	16	4.94%	10.74%	117.41%
Marilyn Monroe	16	9.31%	13.77%	47.91%
Calremont Kind	16	12.91%	17.02%	31.84%
Malbec	10	6.56%	9.36%	42.68%
Chunk City	16	5.77%	8.64%	49.74%
Starfish	16	7.09%	12.99%	83.22%
Rocky Balboa	16	7.13%	7.61%	6.73%
Pueblo Picea	16	8.58%	10.30%	20.05%
Wilt Chamberlain	16	8.83%	9.45%	7.02%

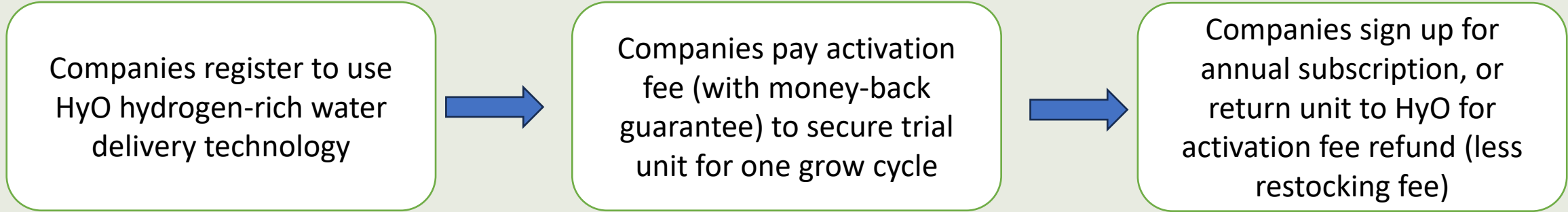




Poultry farms have confirmed roaster chicks were 1 lb heavier after 40 days, and a 90% reduction in death rate, while consuming less feed – when drinking HyO water vs control



HyO Hydrogen-as-a-Service™ (HaaS) Program Design



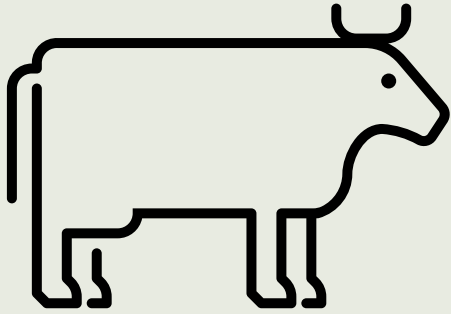
- When signing up for a subscription, customers will indicate their system size, flow rate and water quality
- Many irrigation systems (especially outdoor) will require more powerful units or larger centralized systems
- Upgraded systems and/or more powerful units will increase subscription price
- HyO sales team will guide the unit selection process to optimize for site conditions



How Can HyO Benefit HaaS Subscribers?

Subscription costs are based on conservative yield growth expectations, designed to be **a fraction of the incremental gains** to the farmer

Example: 100-Cow Dairy Farm



Cows drink between 10 and 30 gallons of water per day, with each drinking session lasting just 30 seconds



Cows produce around 7.5 gallons of milk daily



***Academic research on dairy farms indicated that cows produced 20% more fat content in milk when drinking hydrogen-rich water vs control**

HyO adds value through:

- Increased yield
- Healthier cows
- Disease resistance
- Higher quality milk

A dairy with 100 cows could produce an additional **\$150,000 or more in gross income annually** using HyO water, given these assumptions*



HyO Case Study: Indoor Tomato Grow

- Production Yield: 40-80 kg / sq m / year
- Total Production Area: 24,570 sq m
- Annual Production: 1,000 tonnes/yr
- Average Tomato Pricing: \$3,000/tonne (\$1.36/lb)
- Annual Production Revenue: \$3,000,000
- Demonstrated Yield Increase: 10%
- Incremental Annual Revenue: \$300,000
- Annual HaaS Fee: **\$60,000**
 - **5x ROI on incremental spend**



- Additional Value Potential
 - Starting earlier in grow cycle
 - Optimizing for use with chemical disinfectants



HyO systems can be applied in all types of grow operations, at any scale...
And can also be used for post-harvest preservation to extend shelf life

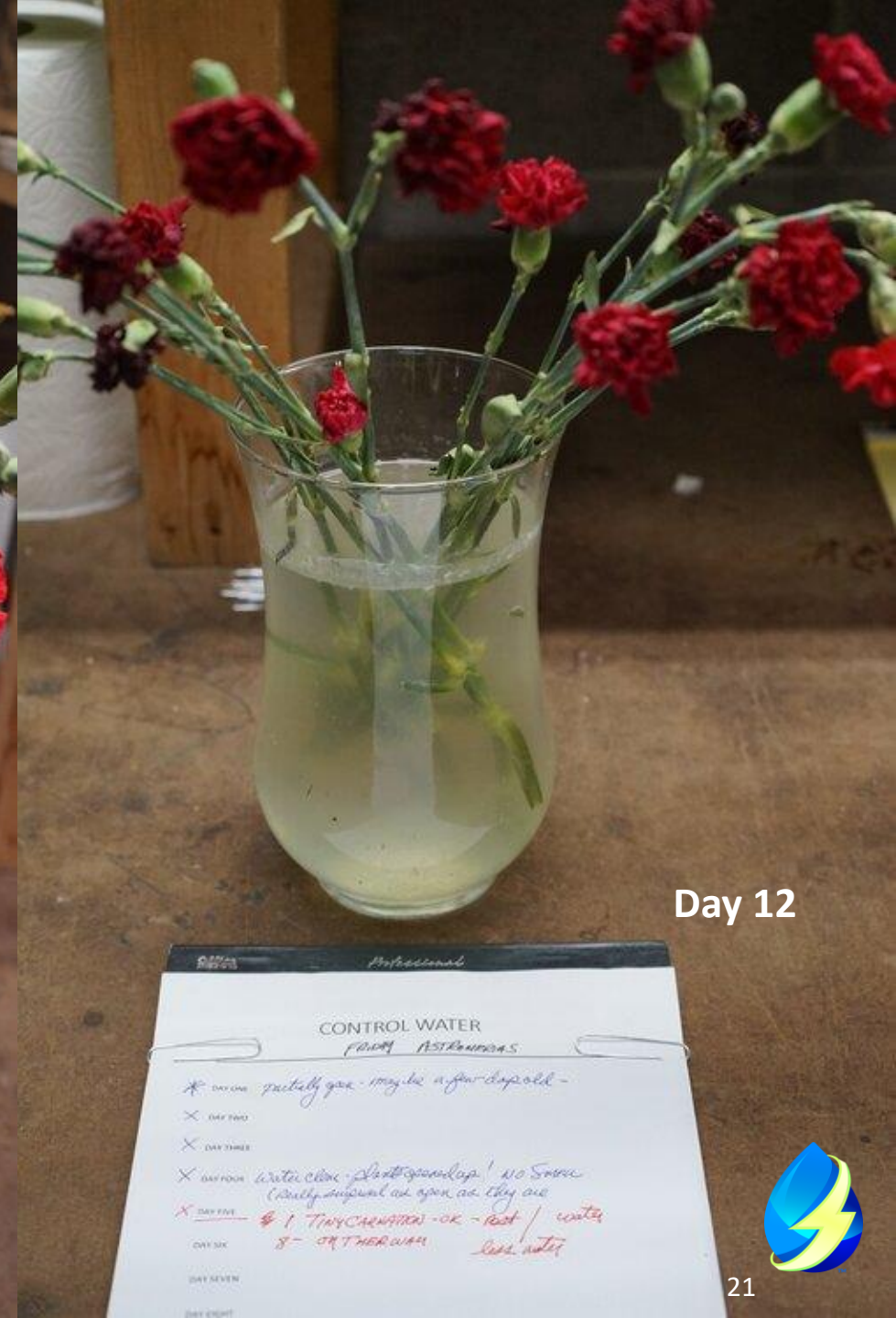


Carnations placed in a vase of control water with floral preservatives were compared with carnations placed in a vase of HyO water without any floral preservatives, and both vases were left at room temperature.

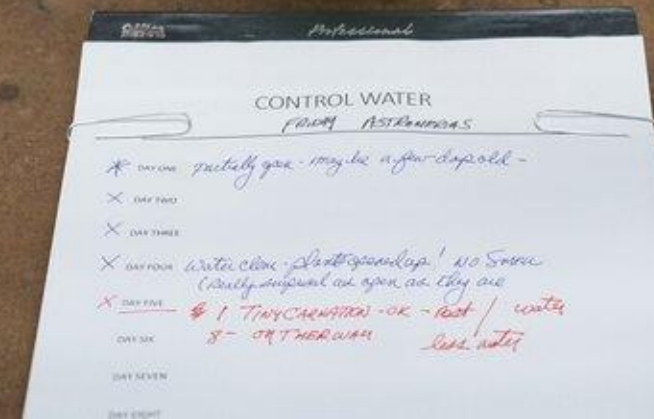
The HyO sample (shown at left) had more than a 200% increase in shelf life.



Day 32



Day 12



**Use of HyO water with a floral foam base, even after drying,
significantly extended the life of hydrangeas**



Day 9



Global Sustainability Impact



- Increases production yield with less chemical inputs
- Extends shelf life of cut flowers, produce, and more
- Enables more flexible logistics for distributors



- Grows deeper roots that help soils store more carbon
- Reduces need for pesticides and disinfectants
- Reduces need for chemical preservatives
- Potentially optimizes energy consumption in cold storage



- Reduces need for agricultural expansion into forested areas
- Restores soils and improve rhizosphere health
- Eliminates need for floral foams contributing to microplastics



Core Brand Values

The era of hydrogen agriculture is upon us. At this critical time in human history, we need to use our resources with maximum efficiency.

That means using nutrients and soil amendments the way God intended. HyO will strive to elevate the farming community as the true stewards of the planet, building trust through ethical and transparent practices in science, business, and charity.





HyO Technologies™

www.hyotechnologies.com