



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





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

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

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

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?



- Easy to install
 - Water supply line connection to an existing pipe or hose between 3/4-inch and 2-inch size on each side of the unit
 - Electrical connection using a basic 110-V plug into a common GFCI receptacle
- Easy to operate
 - Turn on the water supply to the installed unit
 - Once the unit senses that a minimum amount of flow has been reached, it will **automatically** turn on an LED light to indicate that hydrogen is being generated inside the water flowing through the hydrogen cell
 - Once the water flow is stopped, the unit will automatically stop producing hydrogen in the hydrogen cell
- Existing irrigation water supply enhanced with “HyO Water” has led to **extraordinary results!**



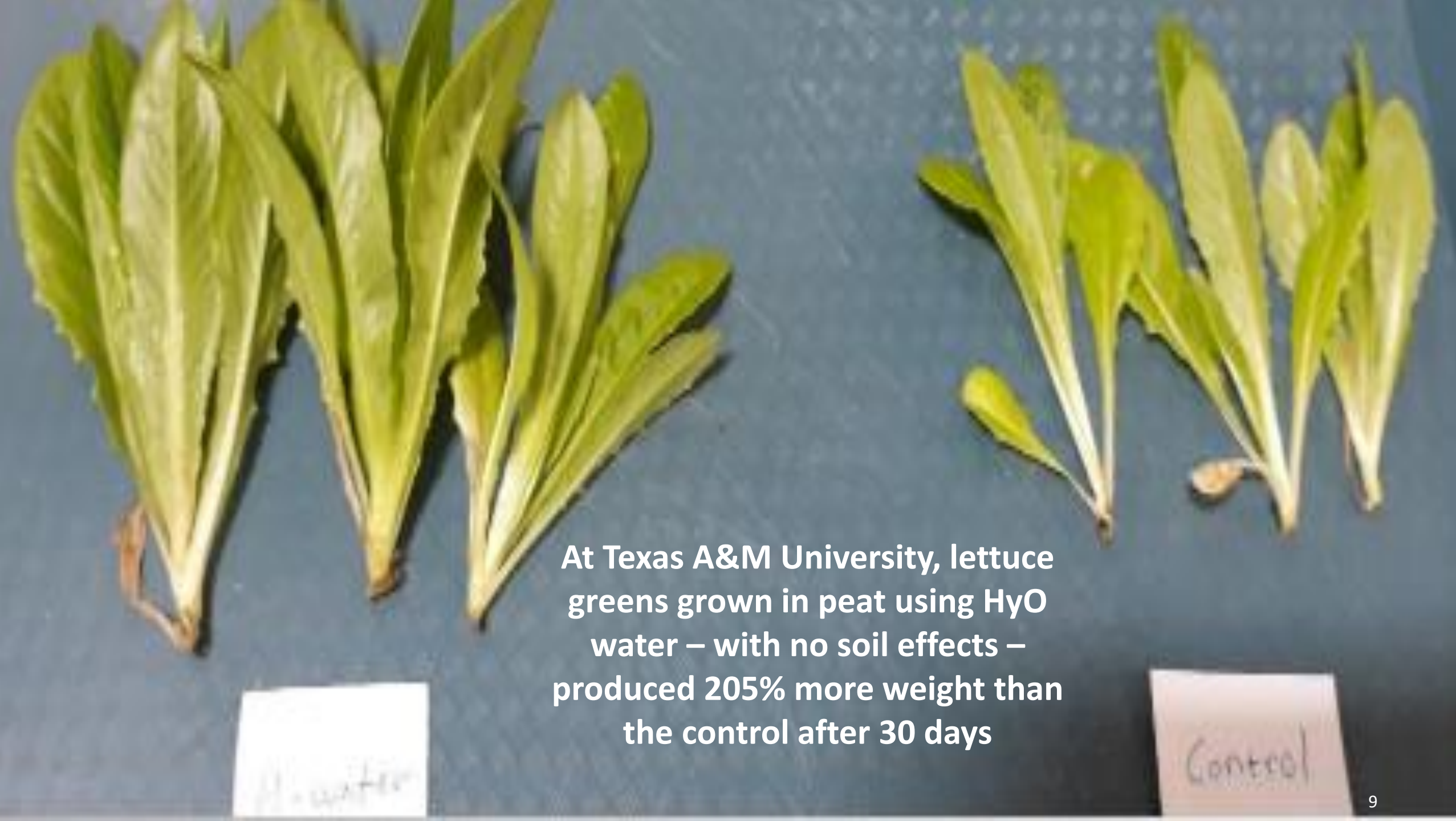
In 2020, a South Dakota greenhouse using a HyO prototype yielded 126% more tomatoes than the control, while virtually eliminating blossom end rot

In 2023, the same farmer was harvesting HyO-grown tomatoes while the control plant was failing, so he switched both to HyO, saving the control crop and helping it to thrive; still, the HyO cohort yielded over 300% more than the control

At a major indoor tomato grow operation in Ontario, trials conducted on tomato transplants yielded 10% more product; plans are underway to expand HyO usage to a larger grow area



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



At Texas A&M University, lettuce greens grown in peat using HyO water – with no soil effects – produced 205% more weight than the control after 30 days

HyO water

Control



In 2023, a trial was conducted at Texas A&M University to grow jalapeño peppers from seed to transplant.

The HyO-watered samples produced significantly more than the control after 30 days.

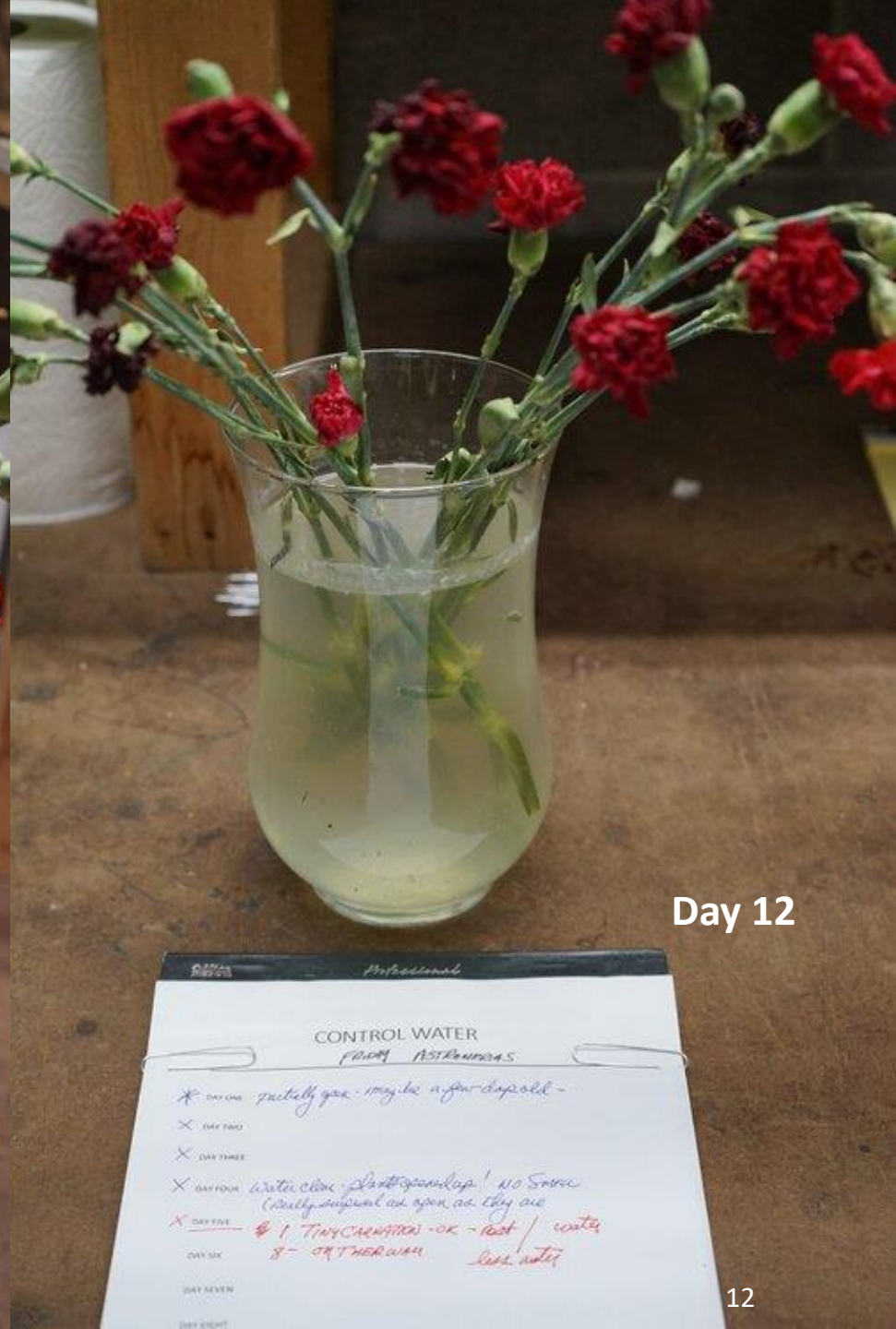


A closer look at the jalapeño peppers trial shows that the samples using HyO water (at left) produced 165% more weight than control, with 33% greater root length and 22% more root surface area

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 a room temperature of 62 °F. The HyO sample (shown at left) had more than a 200% increase in shelf life.



Day 32



Day 12

HYO WATER
CARNATIONS

Professional
CONTROL WATER
CARNATIONS

- X DAY ONE partially gone - maybe a few deep red -
- X DAY TWO
- X DAY THREE
- X DAY FOUR water clear - look good! no brown (really surprised as open as they are)
- X DAY FIVE 1 THY CARNATION - OK - rest / water
- DAY SIX 8 - OTHER WAY less water
- DAY SEVEN
- DAY EIGHT

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



Day 9

Cannabis grown outdoors with HyO water (right) had a much thicker stalk, grew 20% taller, and grew much wider after topping, supporting more buds vs control





Cannabis grown indoors during the summer with HyO water (left) had a **159% increase in seed yield, 41% increase in CBD content**

Ten hemp varieties were selected at week zero of flower growth, with two plants grown from each. HyO water was used on one plant of each variety through the remainder of flower growth through harvest.

After harvesting/drying, five grams of flower was collected from each plant. Independent laboratory testing found that the HyO-treated grow had substantially more CBD than the control for each variety.

Variety	Flower Week	Control CBD Content	HyO CBD Content	CBD Increase
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

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