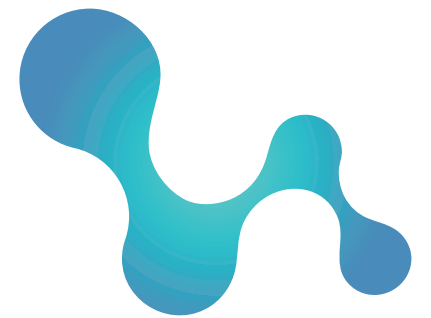


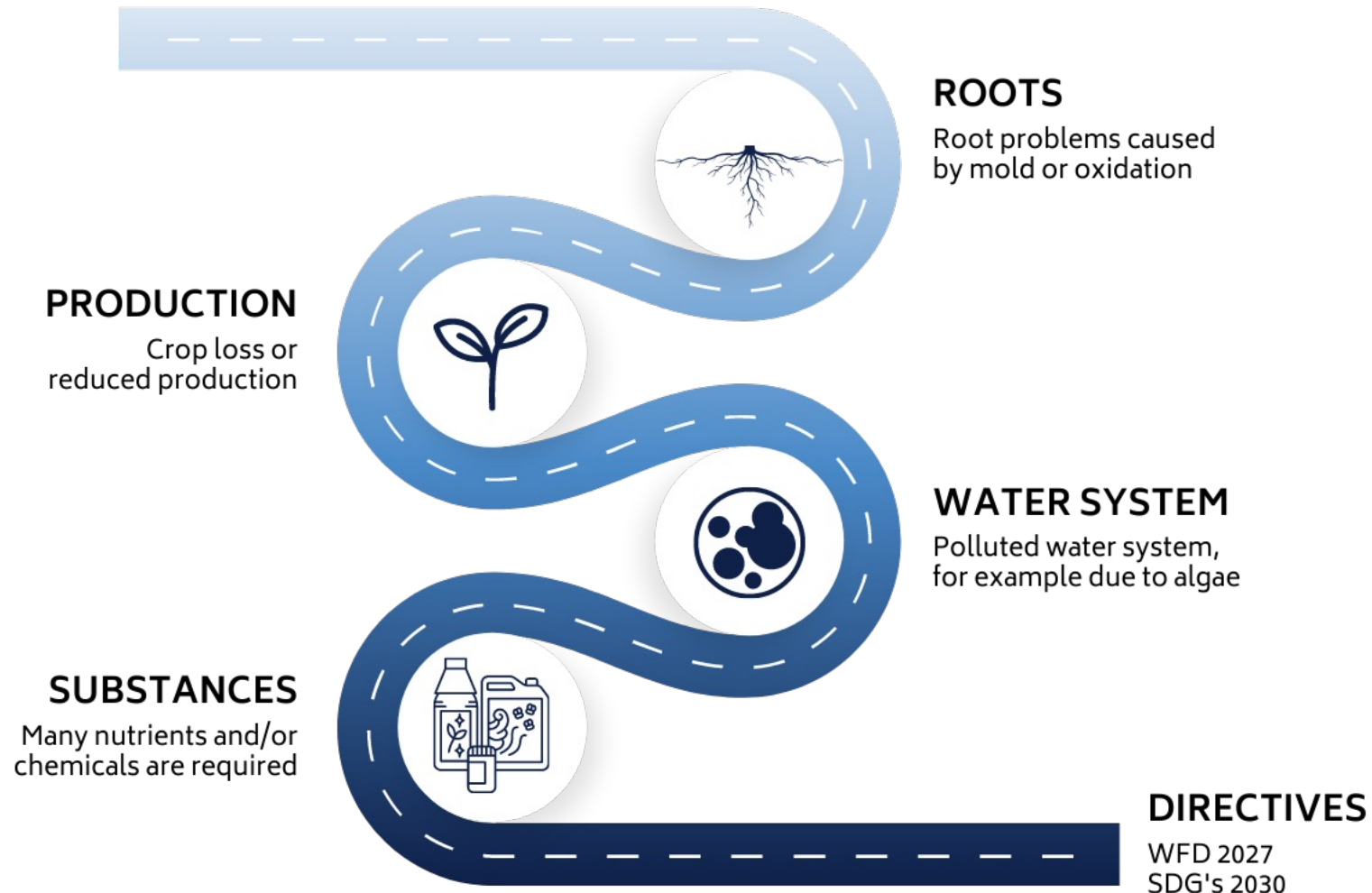


Innovative
water solutions
designed for
horticulture and
agriculture



Fundamental
Systems

What challenges are you facing?





We bring people, animals, plants
and their environment in balance
with hydrogen and oxygen infused water.



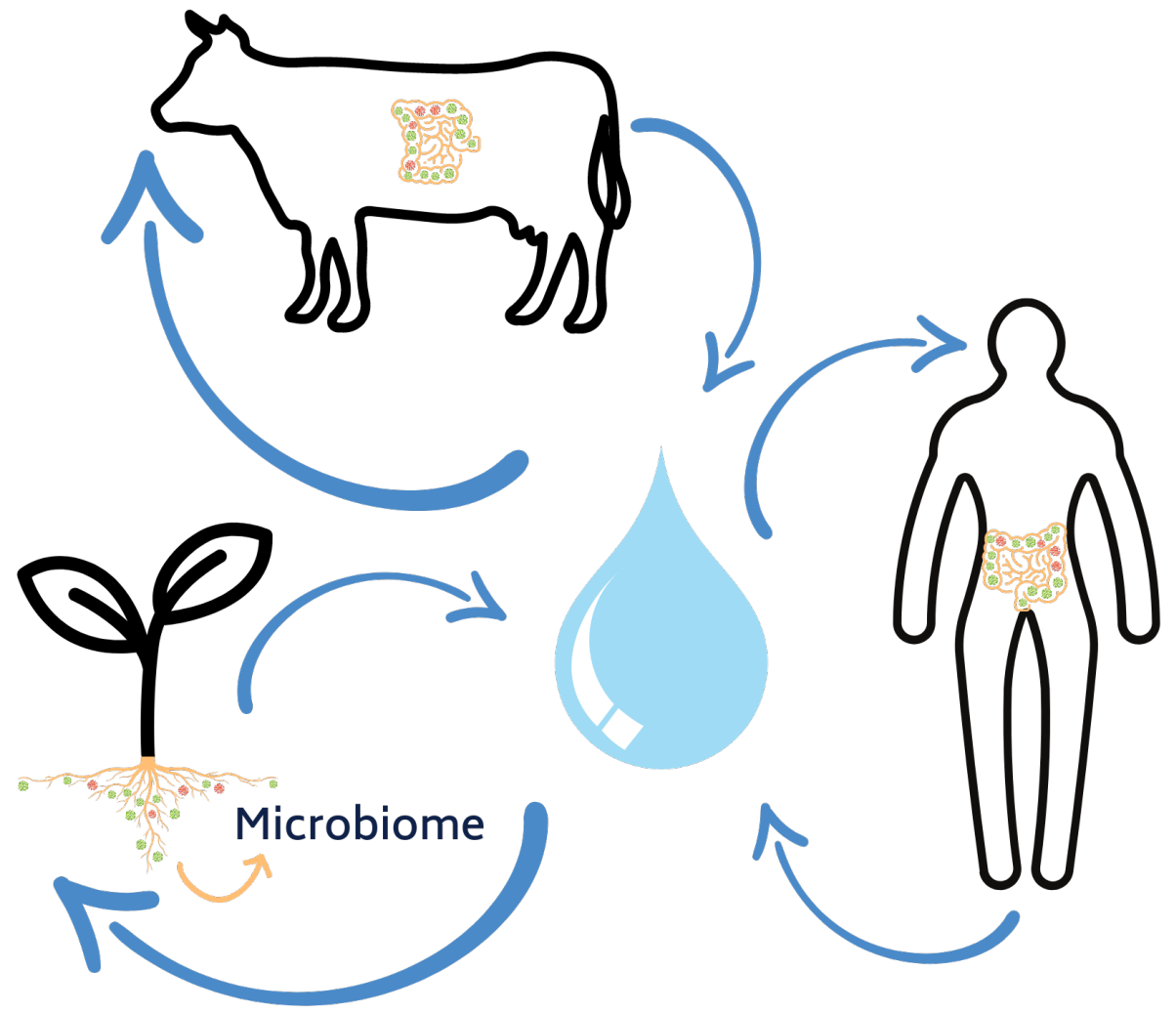


People, animals and plants

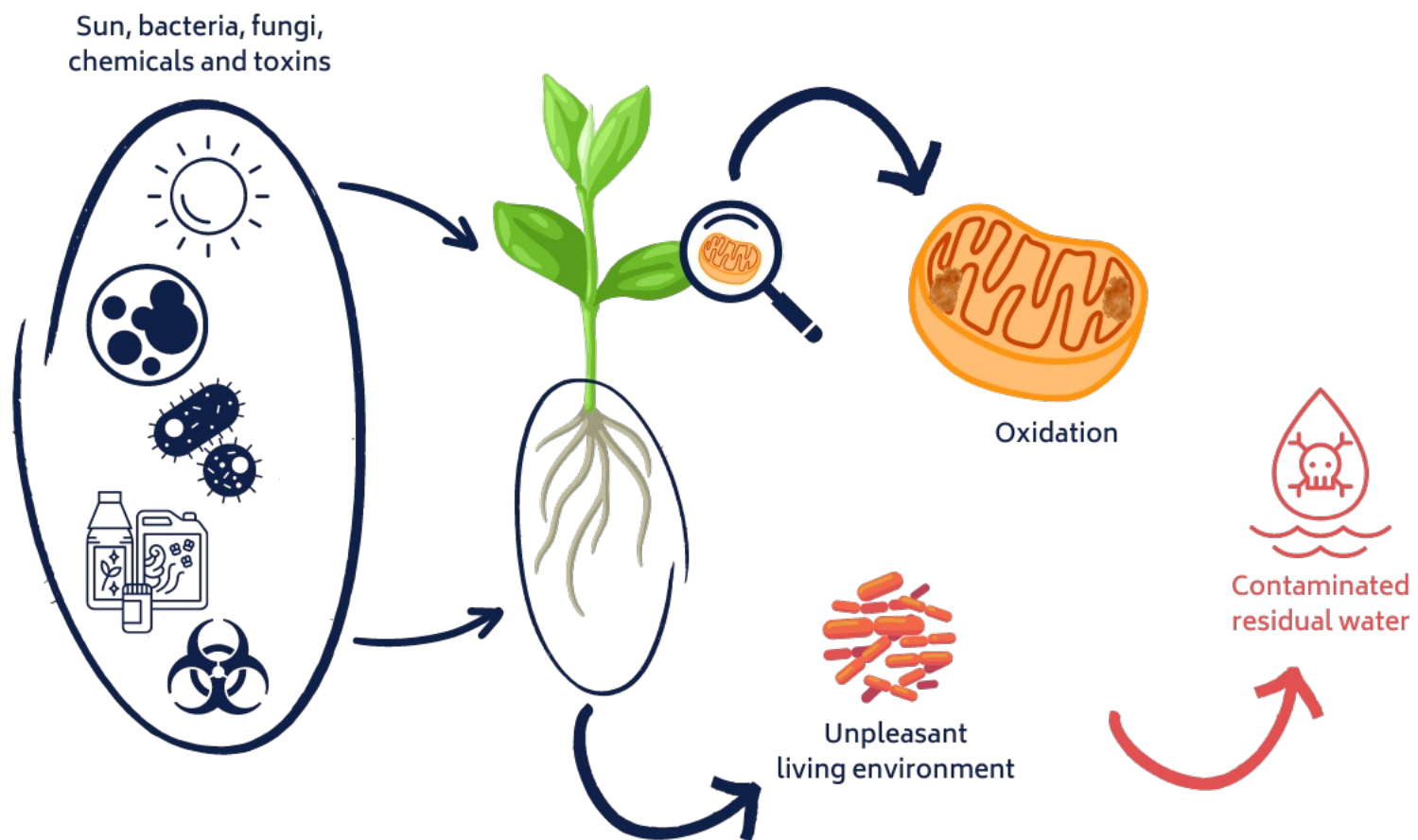
All life consists of a body with a microbiome that absorbs food and water and excretes residual substances. We are also all part of the same water system.

We focus on balancing regulated water systems with hydrogen and oxygen infused water.

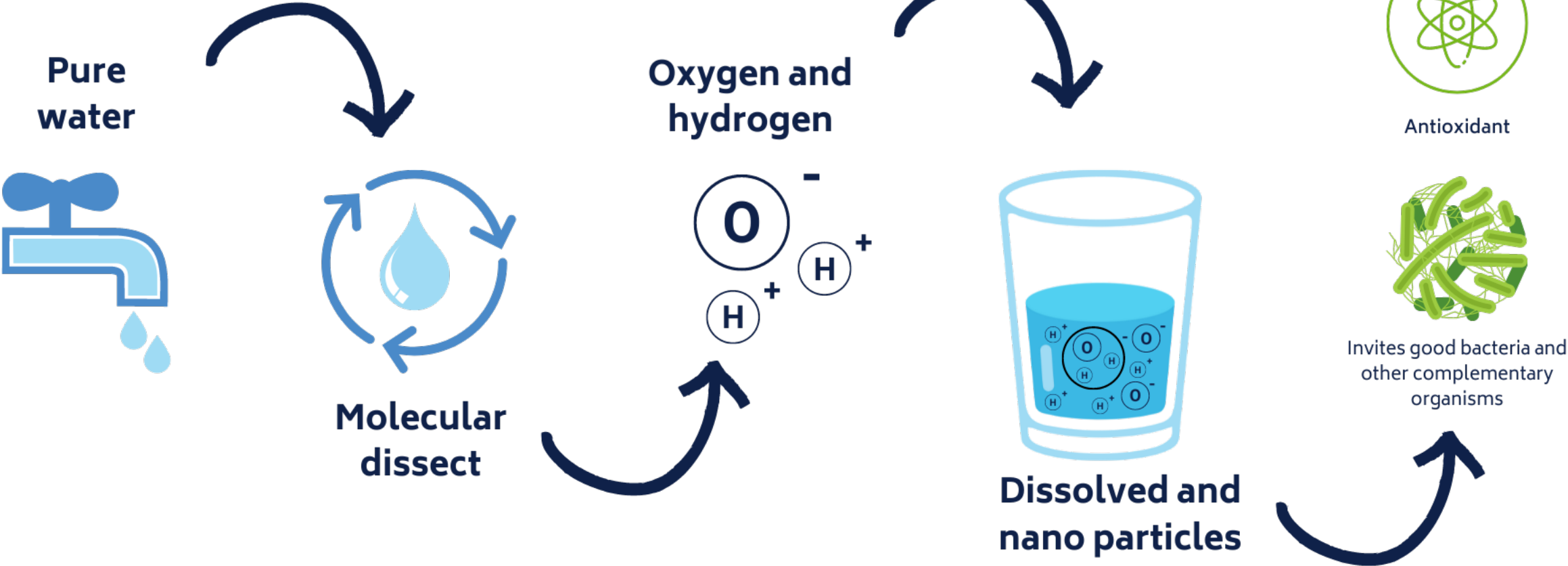
This can contribute to complying with the EU regulations for circular water.

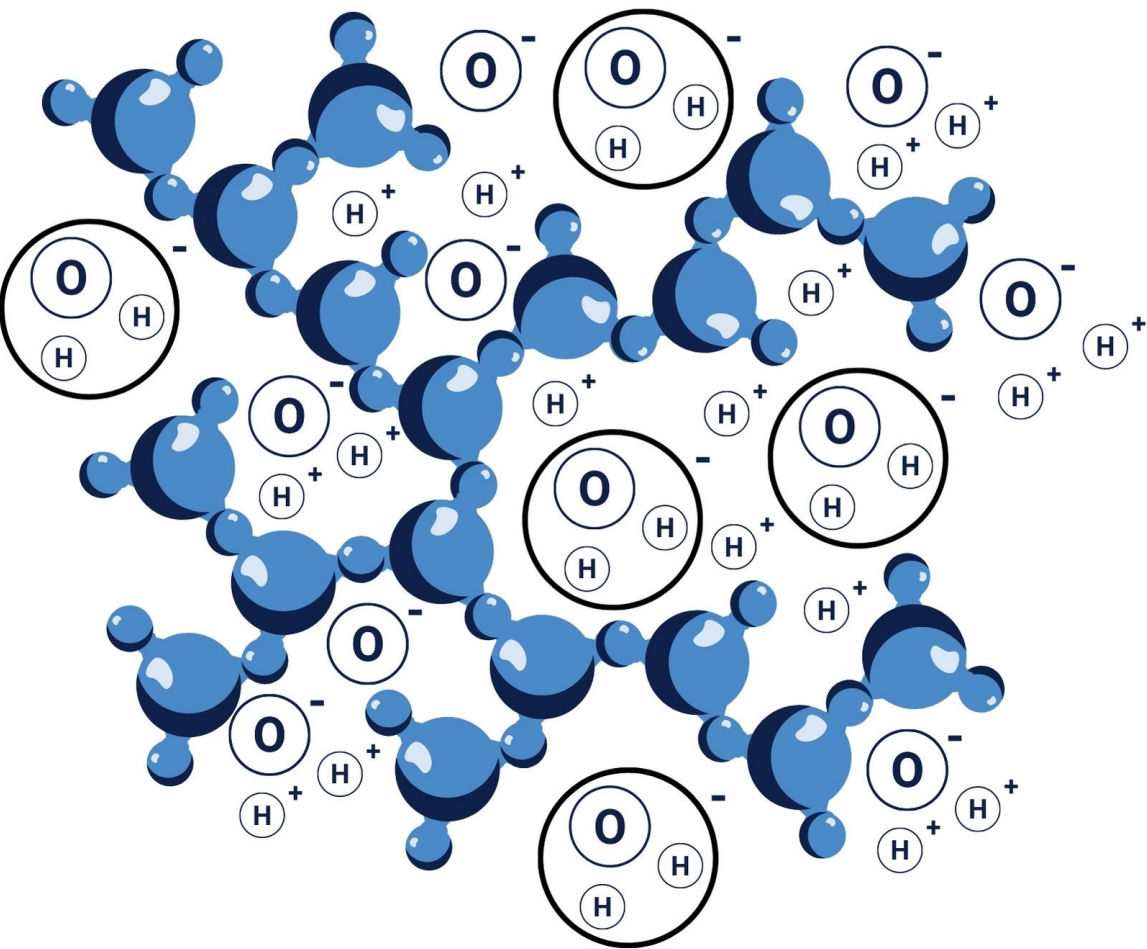


Unhealthy stressors



Our system infuses hydrogen and oxygen into water





Infused water with nano particles

We make infused water with our forced dilution technology. This is water with dissolved hydrogen and oxygen molecules that can be absorbed directly.

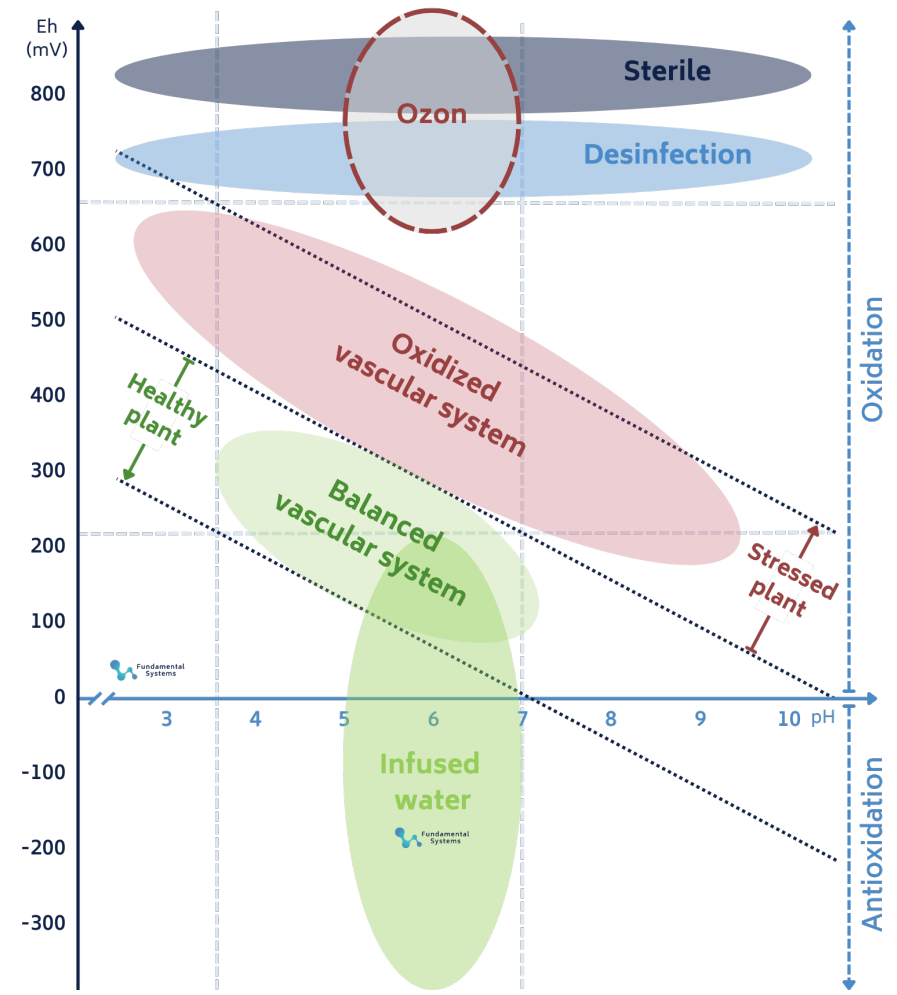
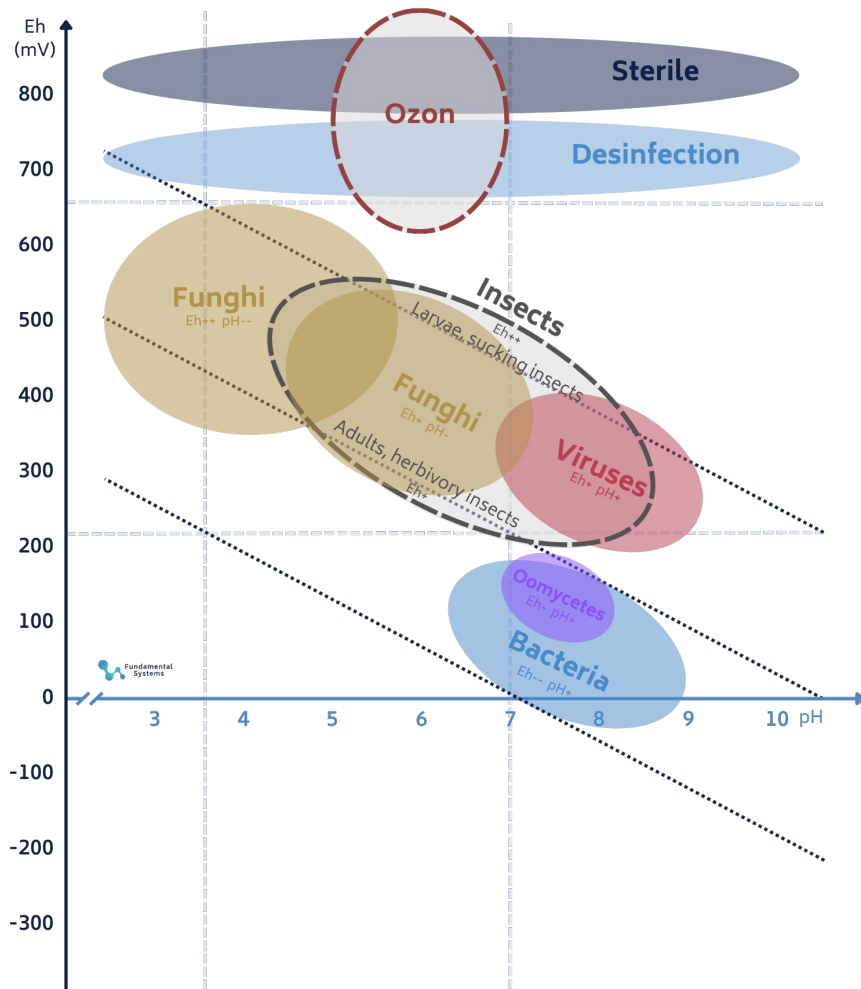
In addition, nano particles (80 Nm) allow us to add more hydrogen and oxygen and allow the molecules to travel further.

We can also enrich the water by dissolving other gases and liquids such as CO₂, bases and acids.



Map of redox worlds

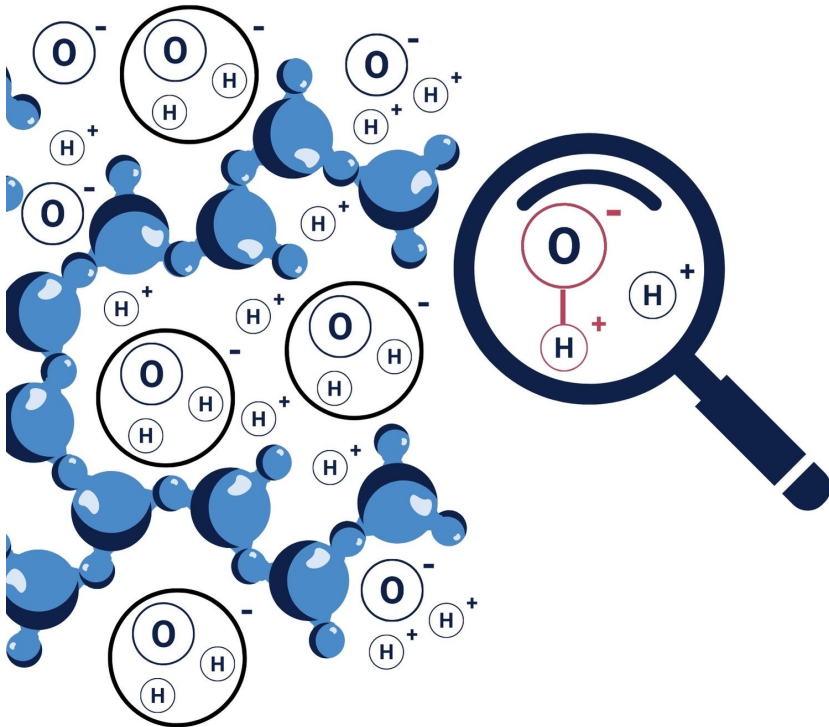
Eh-pH and plant health



Oxidation

When an oxygen and a hydrogen molecule bind together, Hydroxyl (HO^-) is formed.

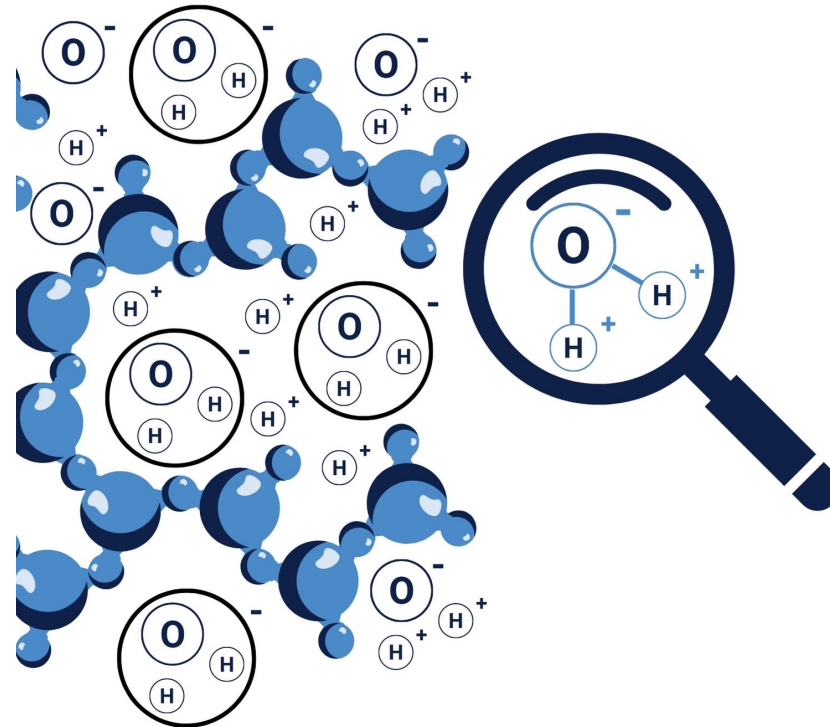
This is a free radical that can cause damage and this compound is irreversible.

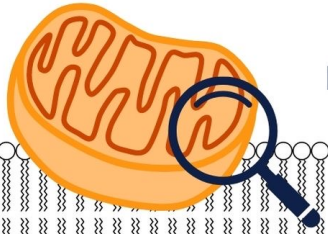


Hydrogen as antioxidant

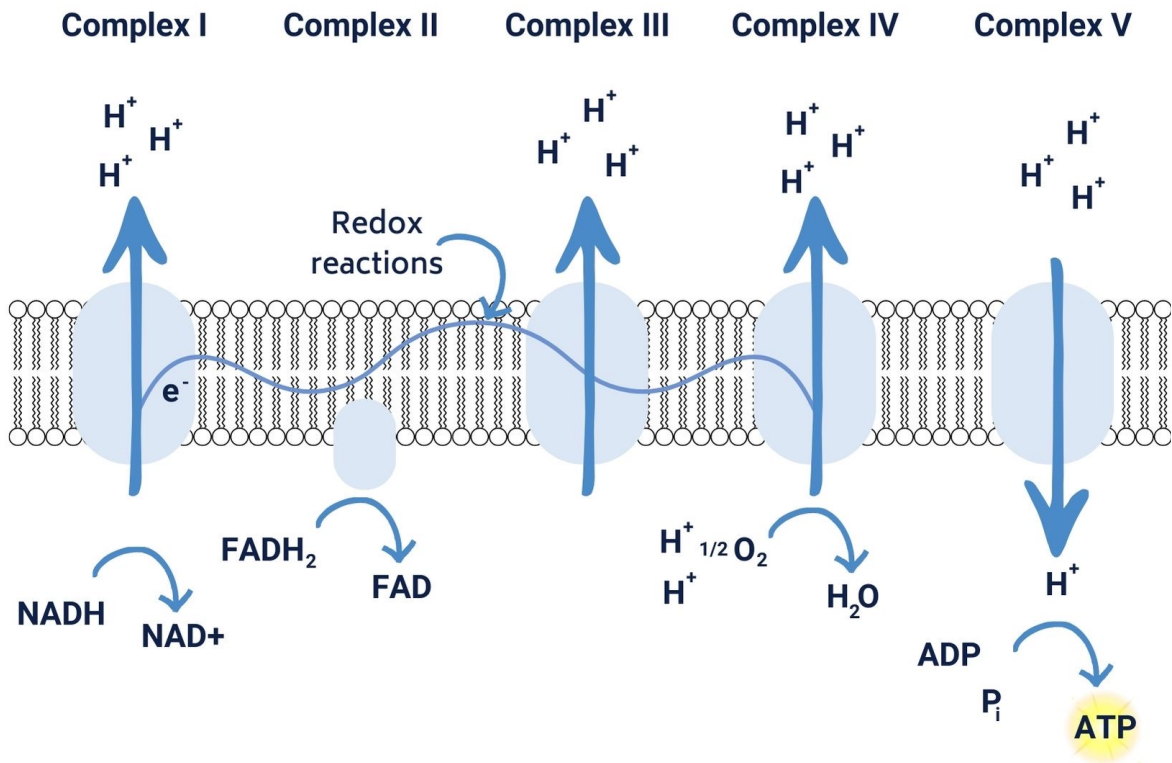
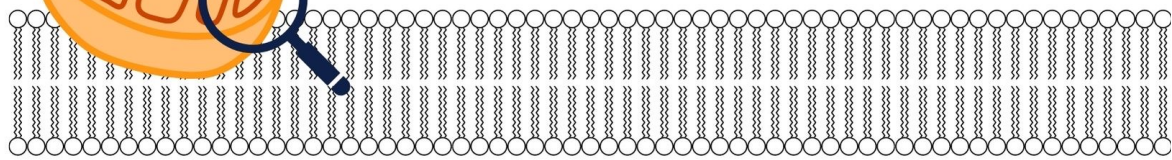
Because there is sufficient hydrogen present, an H^+ can bind to the free radical OH^- and neutralize it by transforming into water (H_2O). This reduces the oxidative stress.

This water is unique because it is coherent and cellular. This is called rejuvenating.





Mitochondria



The mitochondria are the powerhouses of our cells

Energy production in mitochondria is complex. Different parts of the cell work together to break down nutrients.

The processing of glucose into energy (ATP) takes place in the mitochondria. If an oxidative imbalance occurs, the mitochondria work less well and the cell can eventually die.

By creating a good balance between oxidants and anti-oxidants, the redox reactions harm as less as possible and the cells remain healthy.

The goal is to achieve a balance between oxidants and antioxidants

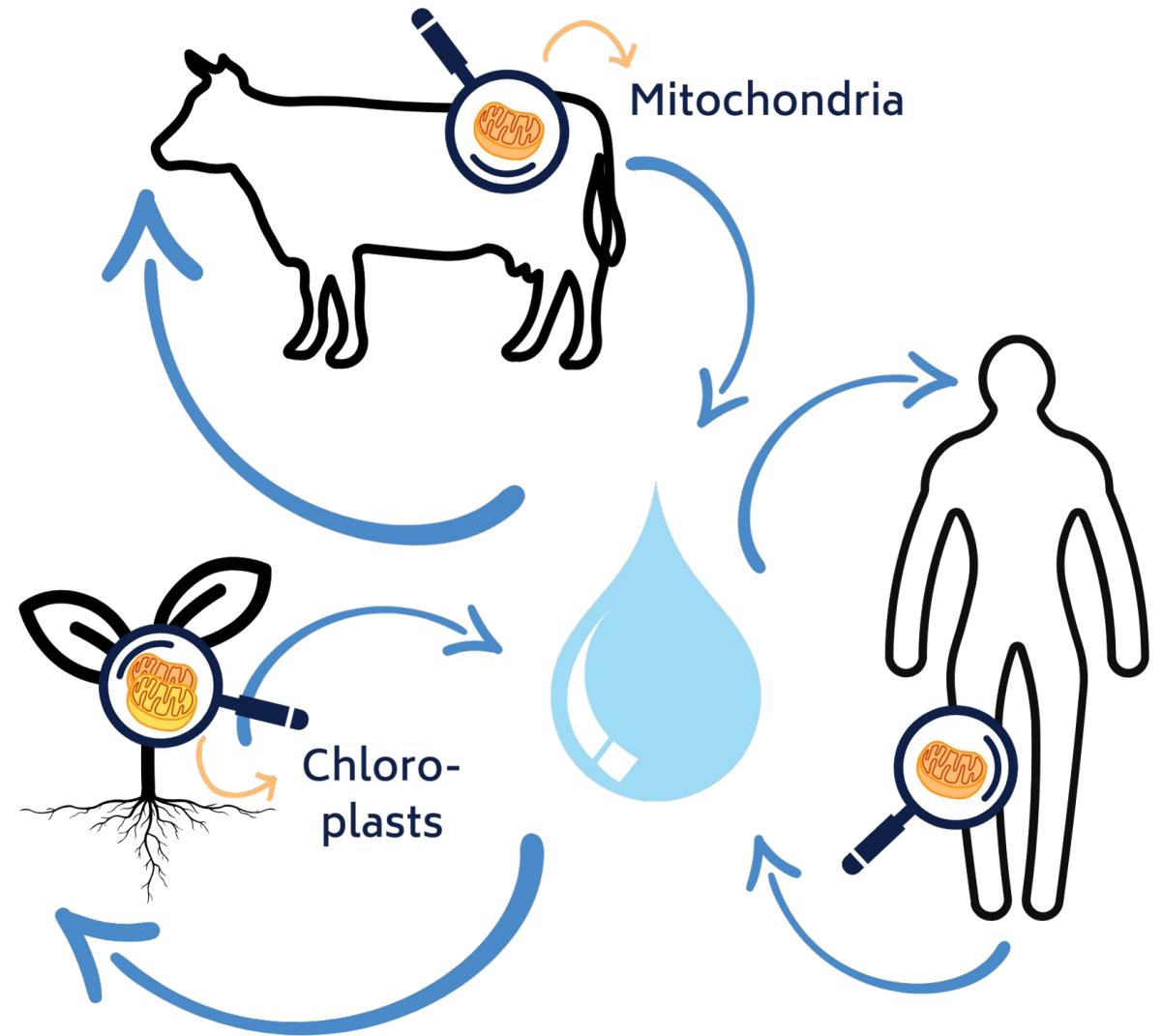


Energy production in plant cells

All living organisms have mitochondria in their cells. Plants also have chloroplasts, this is where photosynthesis takes place.

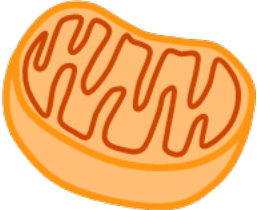
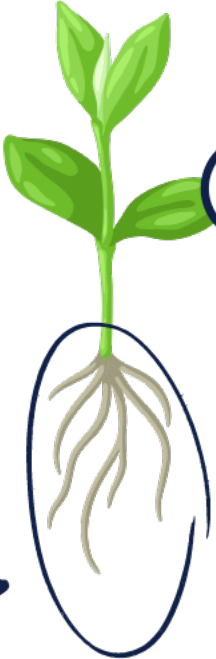
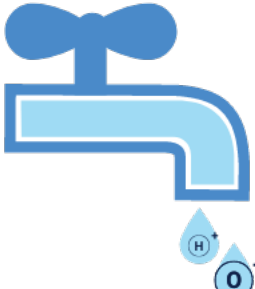
Mitochondria and chloroplasts work together, this helps plants to function efficiently under different light conditions.

Both forms of energy production are optimized by infused water.



Effects of infused water

Rain and tap water with infused water



Healthy cells



Pleasant living environment



Clean residual water

The advantages



Faster recovery from insufficient light



Higher resilience



Good bacteria and other complementary organisms in the microbiome



Better absorption of nutrition, therefore less or no fertilizer is required



Less or no chemicals and pesticides required

A healthy plant and circular water management



Effect of water treatment

- Temp 22,0
- SPC 1.03 -mS/cm
- C 0.98 -mS/cm
- PH 8.67
- PH -84.4 MV
- DO 82.5 %
- DO 7.19 Mg/L
- ORP 670.2.4

Hydrogen



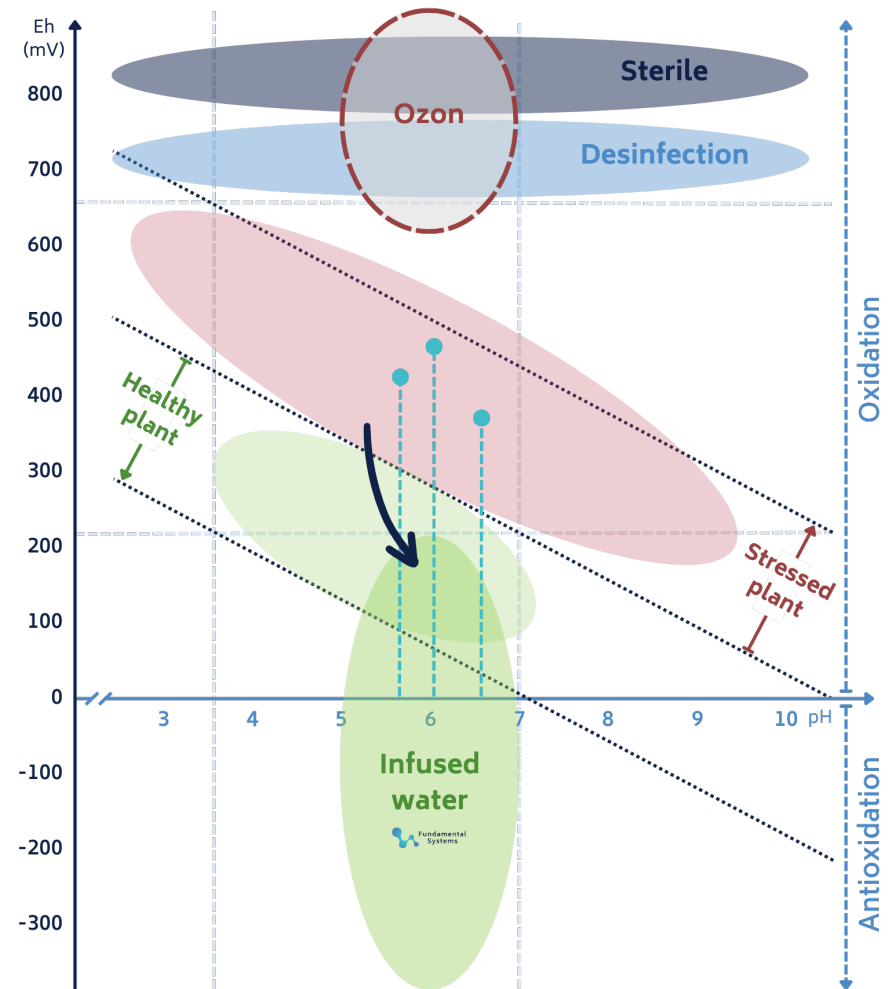
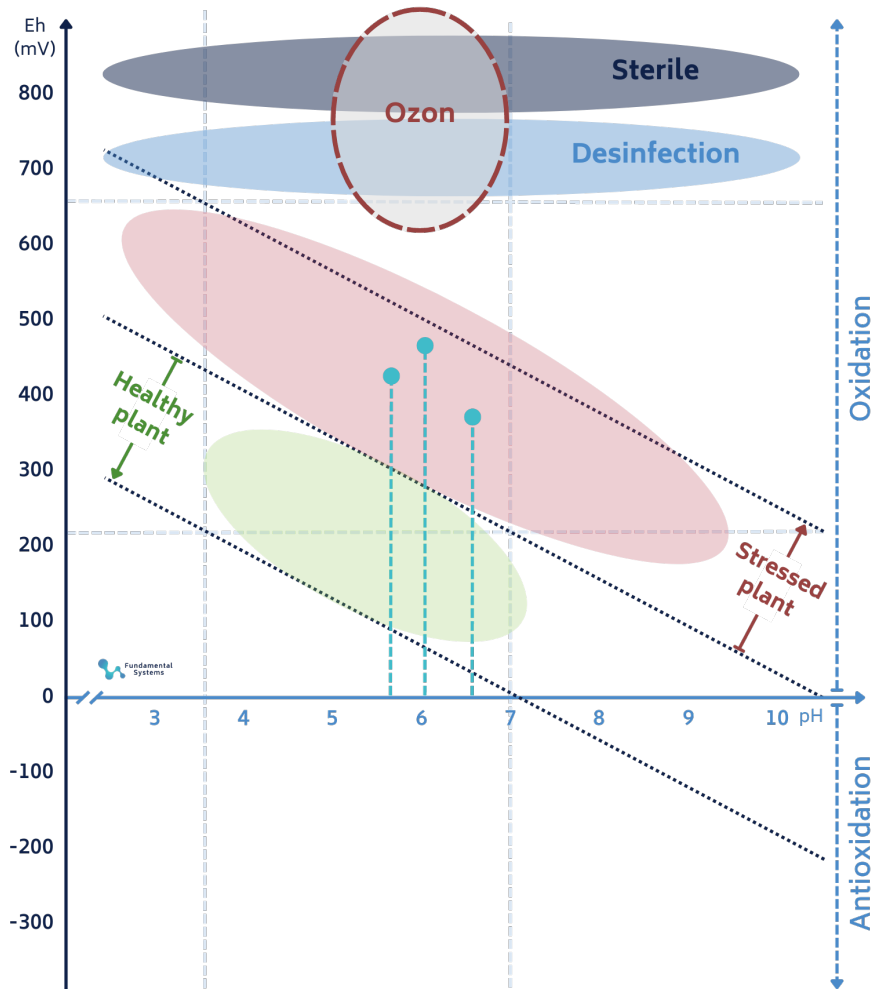
Oxygen

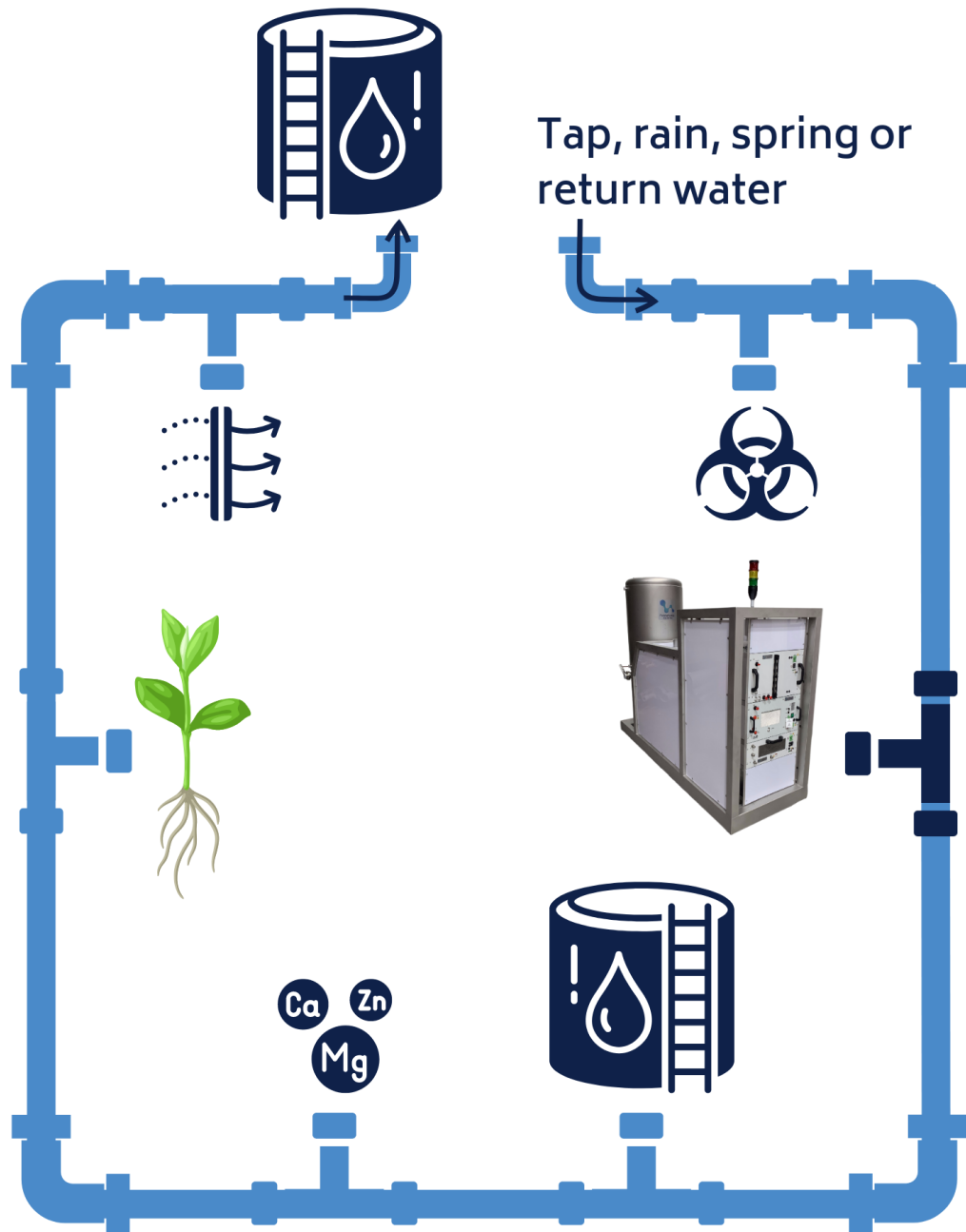
- Temp 26,6
- SPC 2.63 -mS/cm
- C 2.71 -mS/cm
- PH 6.21
- PH 51.5 MV
- DO 195,5 %
- DO 15.66 Mg/L
- ORP - 255.4



Map of redox worlds

Eh-pH and plant health



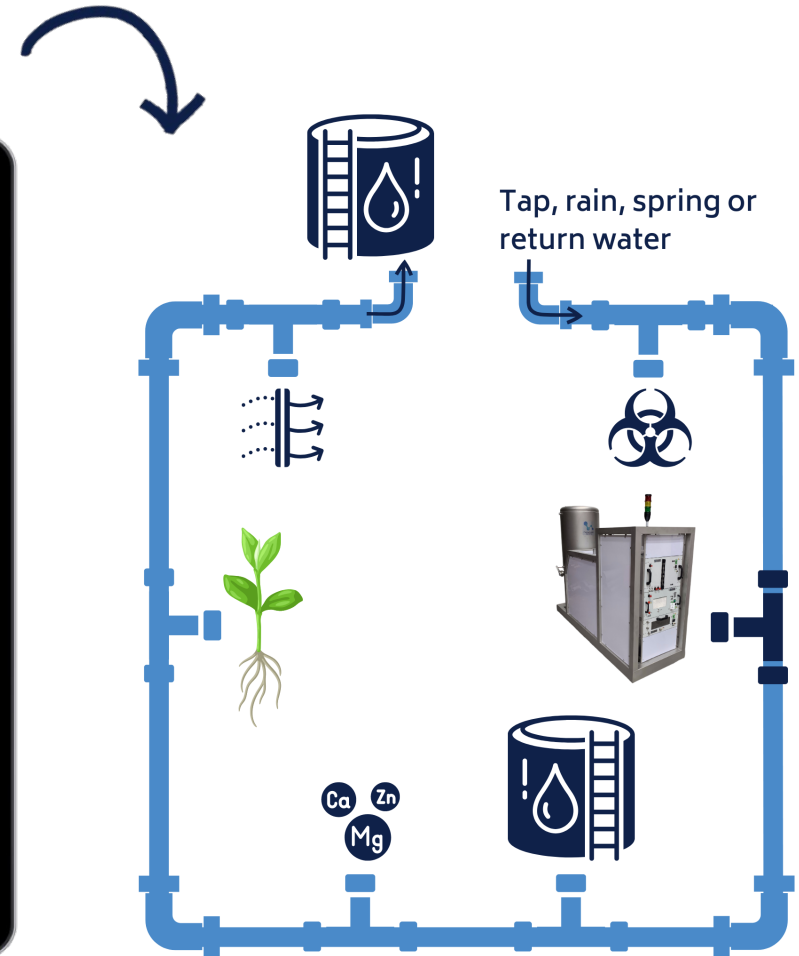
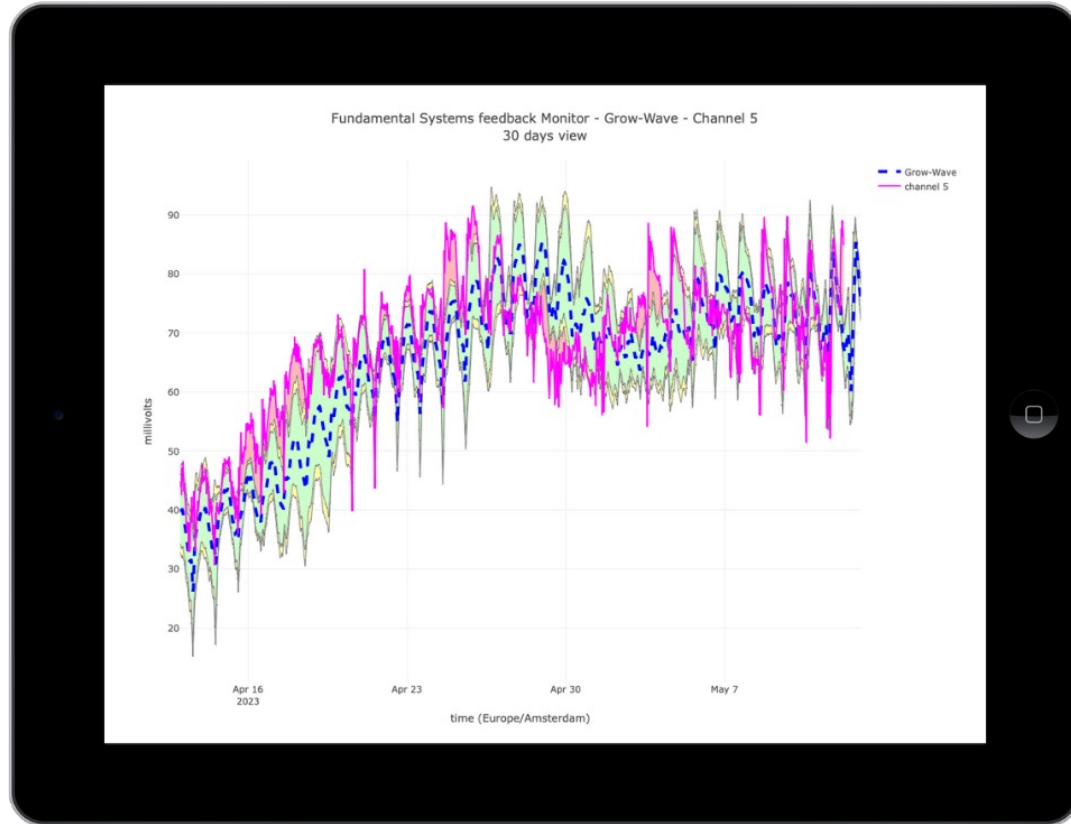
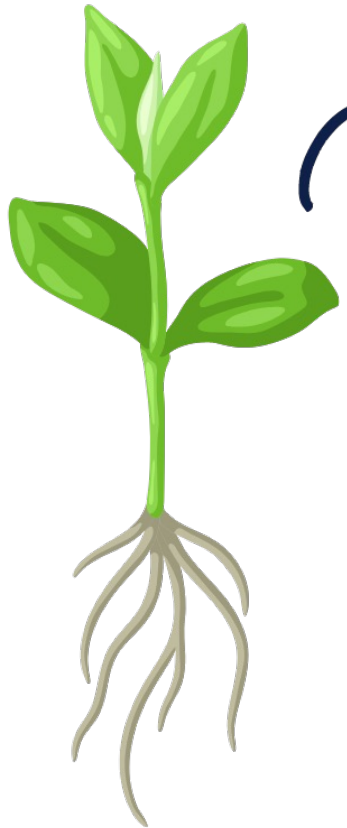


Integration of the system

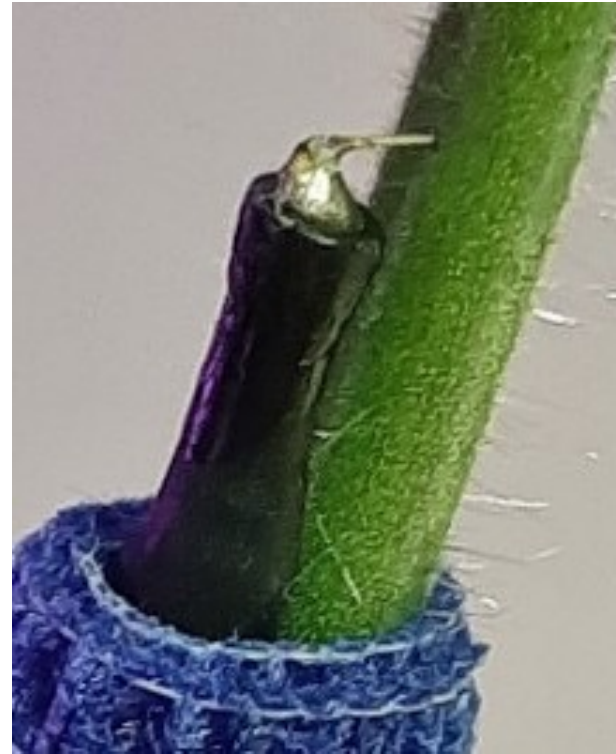
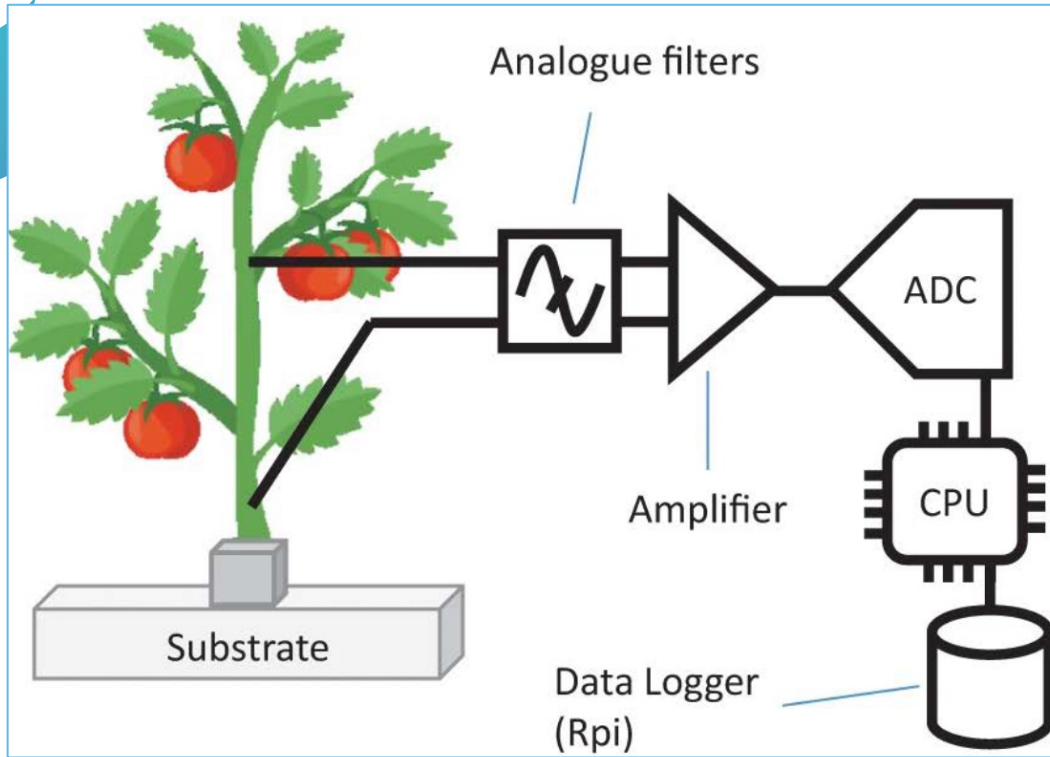
- Customized and integrated into existing water system
- Low footprint and floor space
- Cloud based
 - Real-time insight
 - From reactive to proactive
 - Continuous improvement
 - Research partners



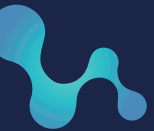
Possibility of real-time biofeedback

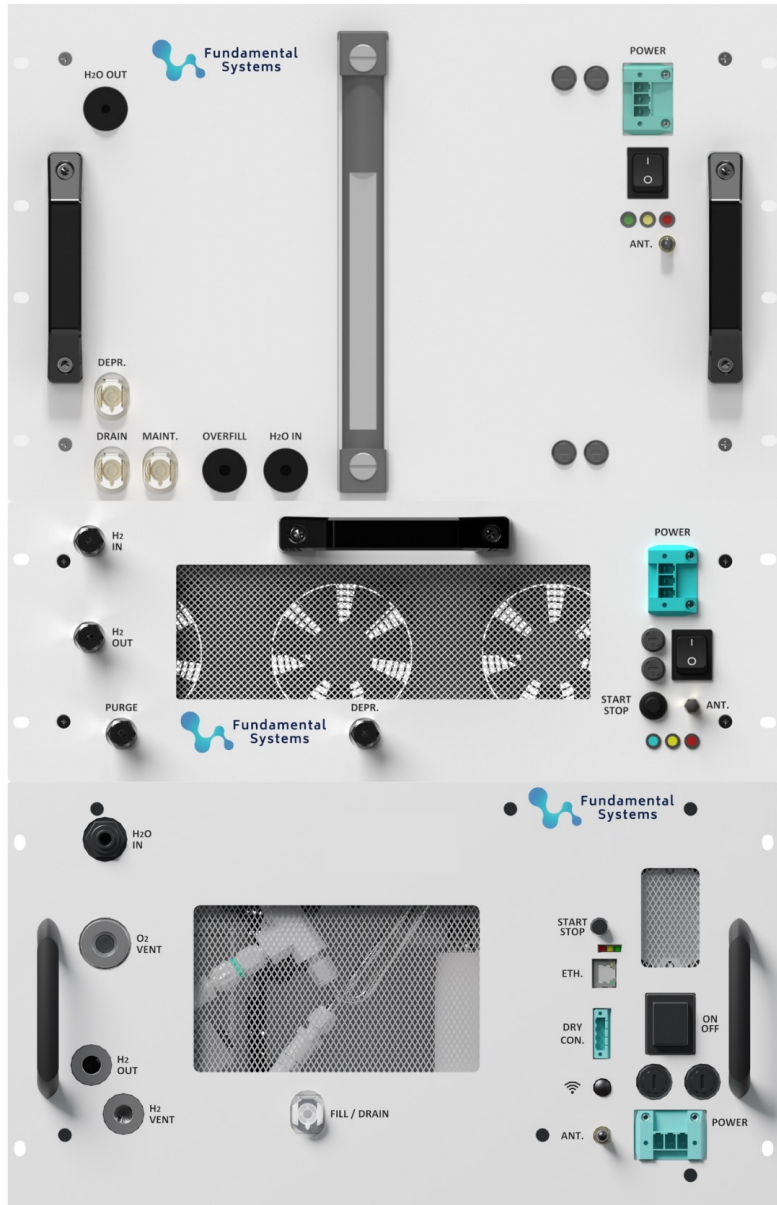


Biofeedback



Our systems





Modular system

- Electrolyser: stackable and flexible system to produce hydrogen and oxygen on site
 - 2,5 kW nominal
- Dryer: increases the hydrogen purity to 99,999%
 - 200 watt nominal
- Water tank: provides storage for 38 liters of demineralised water for the electrolyser
 - 35 watt nominal



Basic skid

Our basic skid infuses from 5,000 liters per hour. By adjusting the recipe, one skid can infuse up to 100,000 liters per hour.

Is the required quantity larger? Then multiple skids can be used, centrally or decentrally.

Our products are designed and assembled in the Netherlands. In addition, they comply with all relevant European standards and regulations.



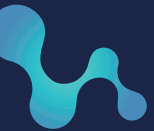
Sample setup



Sample setup



Research results





Cultivation trials

We conducted research on tulips, tomato and bell pepper plants during six months in collaboration with Vivent, Verify, STOWA and students of the Tesla Minor Team from the University of Amsterdam.

One half of the crop was treated with infused water and the other half acted as a control group. The crops were treated with infused water containing 67% hydrogen and 33% oxygen.



The cultivars



Crop Tomato	Name Bronsino F1
Type Bunch	Fruits per bunch 5, joined
Type of plant Powerful and brief	Tolerance Si
Shape Round	Weight 130-150 gr
Resistances HR ToMV:0-2/Ff:A- E/Fol:0,1/For	Resistances IR TSWV/On



Crop Bell pepper	Name Maranello F1
Type Blocked	Color Red
Type of plant Powerful and brief	Earliness Very early
Size 85-95 mm	Weight 130-150 gr
Resistances HR Tm:0-2	Organic Yes



Crop Tulip	Name Strong Gold Purple Prince Silver Dollar
Size 10-11	Root length 5 cm
Length 42 cm	Weight per cm 0,6 gr
Weight 25 gr	Remarks No ruptures Firmer leaves
Dropout 1,8%	



Tomato and bell pepper

- Full life cycle: from seed to harvest
- Drip irrigation in a greenhouse
- Effect of treatment on plants measured via biofeedback
 - Plant rhythm and activity profile measured
 - Despite exposure to high stress, crops remained good quality
 - Analysis by Vivent's plant scientists



Untreated

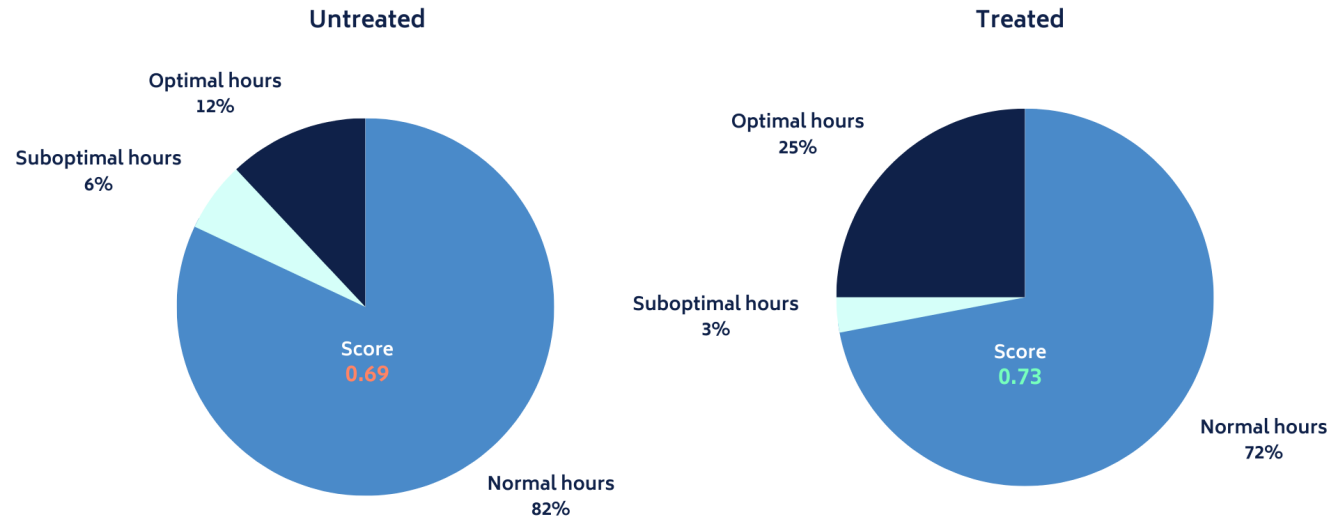


Treated

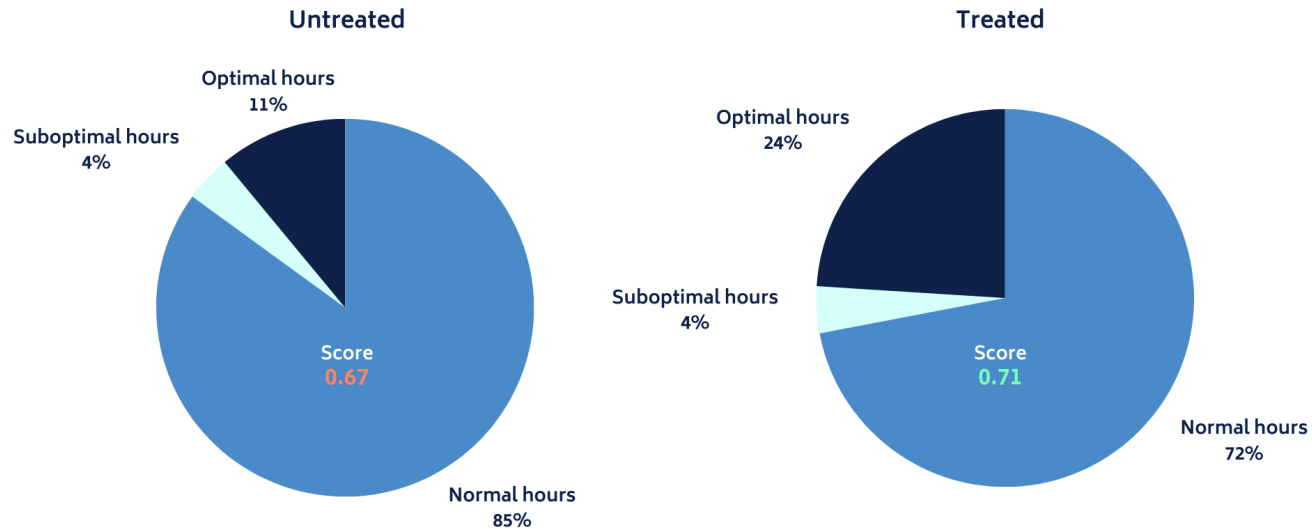


Plant rhythm score

Tomato



Bell pepper

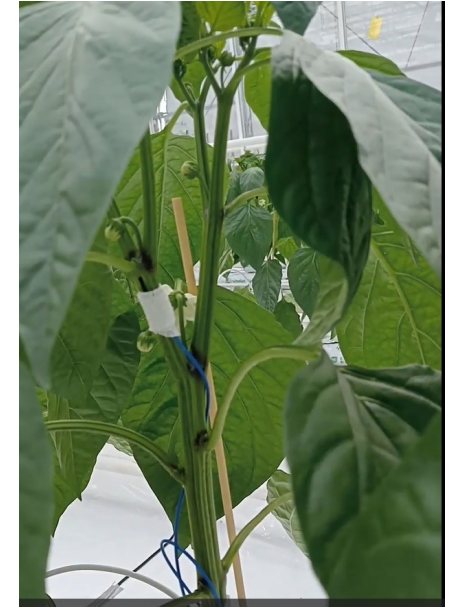


“Treated plants have a more stable plant rhythm, a strong link to big changes in climate” – Team Vivent



Key takeaways

- Treatment helps in reducing plant response to stressors and changes in climate and stressors: they gain higher resilience
- Treated plants
 - Have a more stable plant rhythm
 - Show higher activity
 - Have a higher yield per plant in kg:
 - Tomato +12%
 - Bell pepper + 8%





Key takeaways

In the treated plants, we saw a higher

- Nutrient index balance
- Photosynthetic activity

And they required less

- Chemical intervention
- Plant protection products

No negative effect was found from water infusion on the

- Plant
- Microbiome around the roots
- Water balance
- Composition of nutrients





Tulips

Full production cycle with semi-eb and flood system in crates with overflow

Water

- Circular water system
 - Brew and pull
- Microbiome shifted to bulbous
- No intervention in water necessary
- Nutrients unaffected by infusion

Root system

- Smaller root development
- White fresh roots
- More energy from bulb for growth





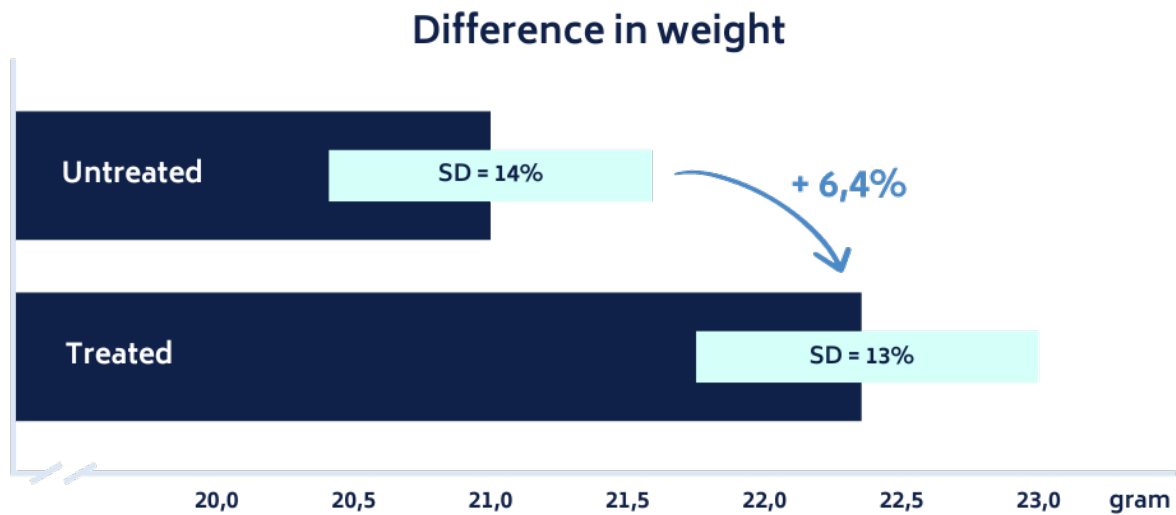
Results from the field

Tulips forager Wesselman Flowers has started working with our system. Together we tested what effect the treated was has on his tulips. We gave half of the bulbs treated water and the other half untreated water.

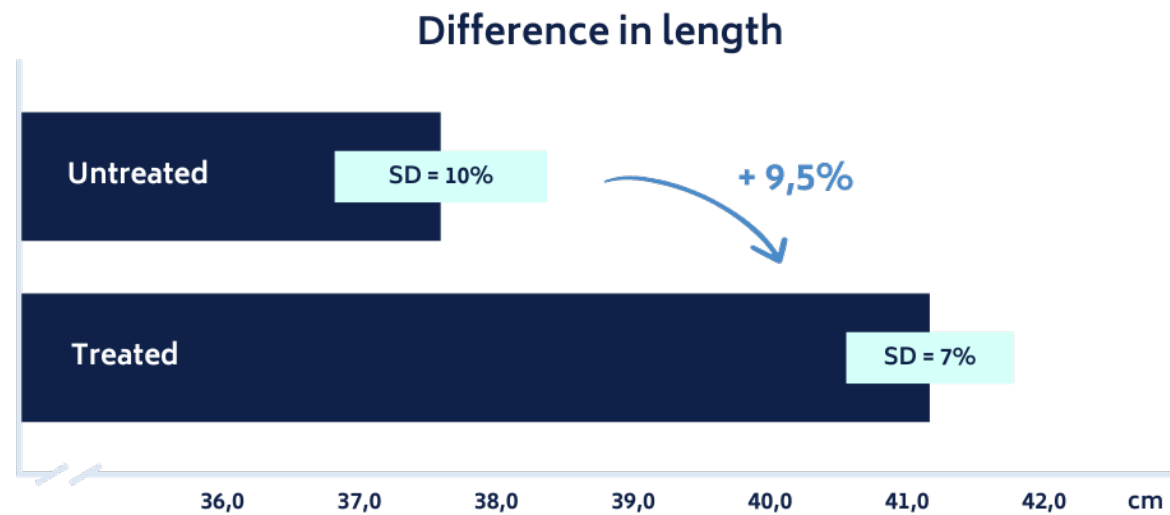
The treated tulips:

- Were heavier, longer and more uniform
- Had less phenolic pressure and lower failure rate
- Had higher root quality and smaller root development

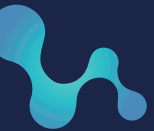




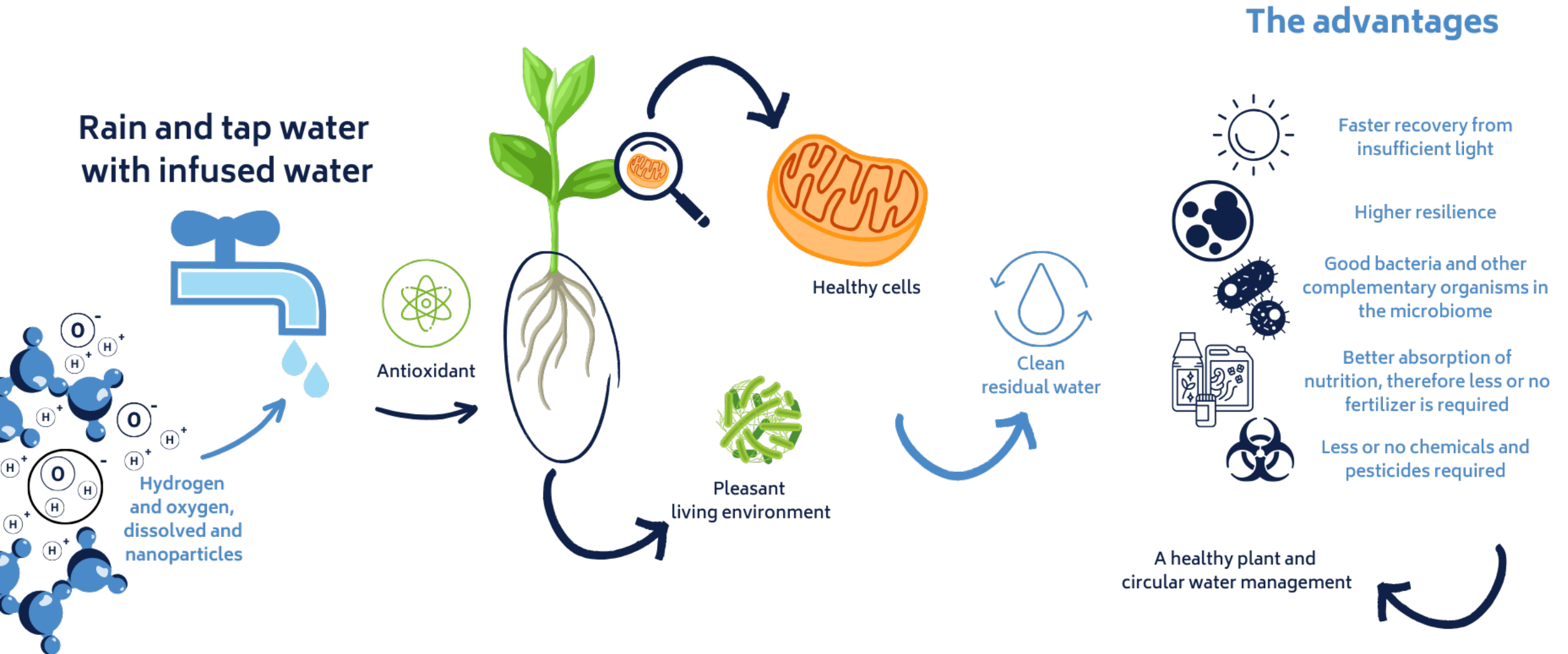
The results



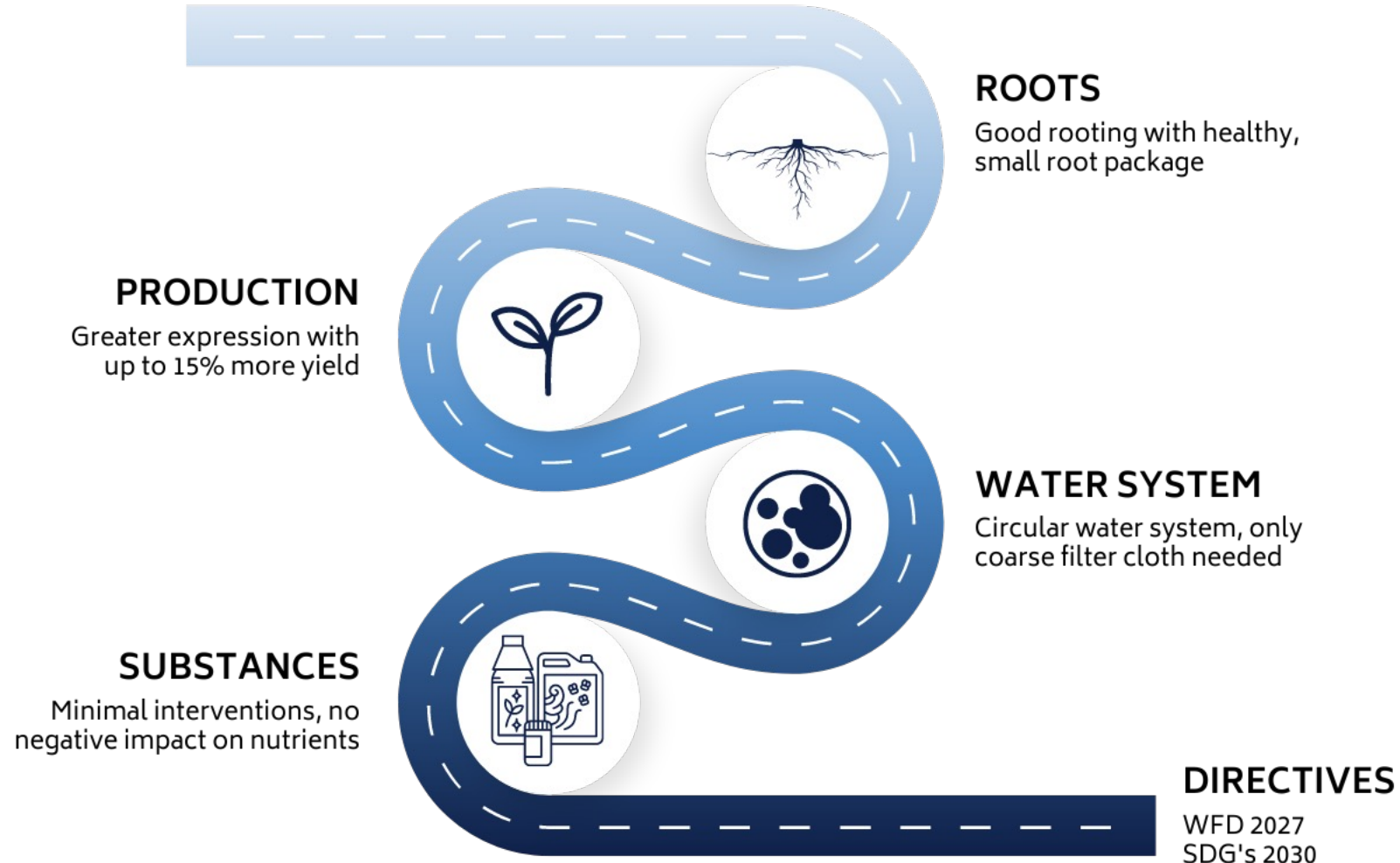
Recap

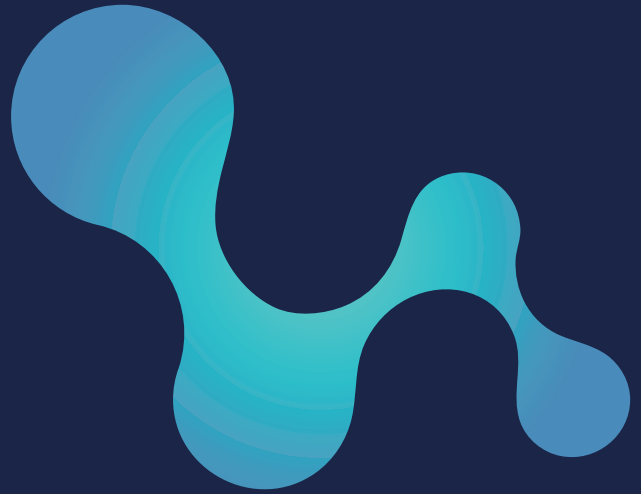


This is how our water treatment works



The benefits of our water treatment





**Fundamental
Systems**