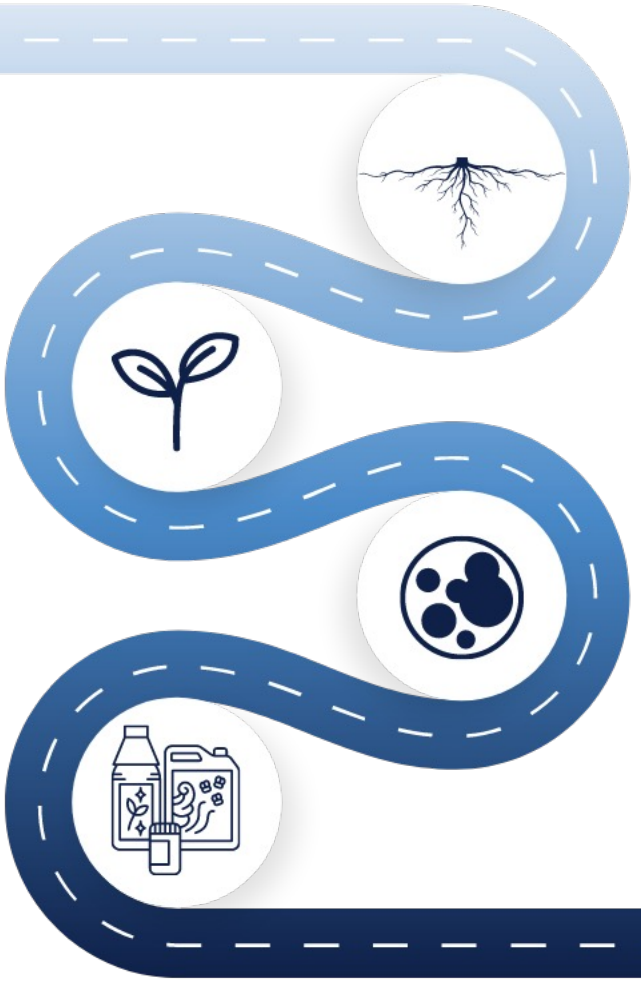
Innovative water solutions designed for horticulture and agriculture

Fundamental Systems

What challenges are you facing?



ROOTS
Root problems caused by mold or oxidation

PRODUCTION
Crop loss or reduced production

WATER SYSTEM
Polluted water system, for example due to algae

SUBSTANCES
Many nutrients and/or chemicals are required

DIRECTIVES
WFD 2027
SDG's 2030

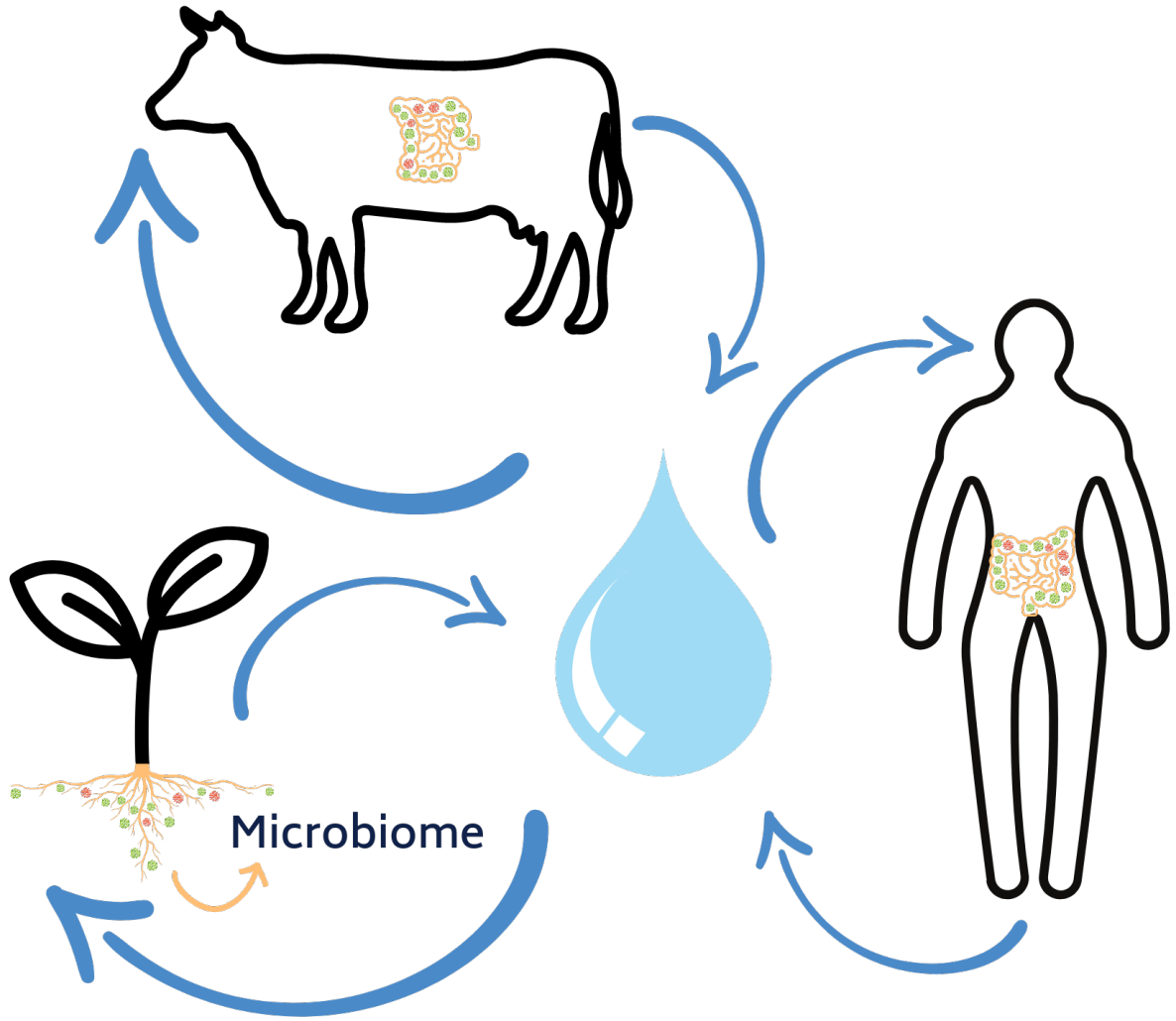
We bring people, animals, plants
and their environment in balance
with hydrogen and oxygen infused water.

People, animals and plants

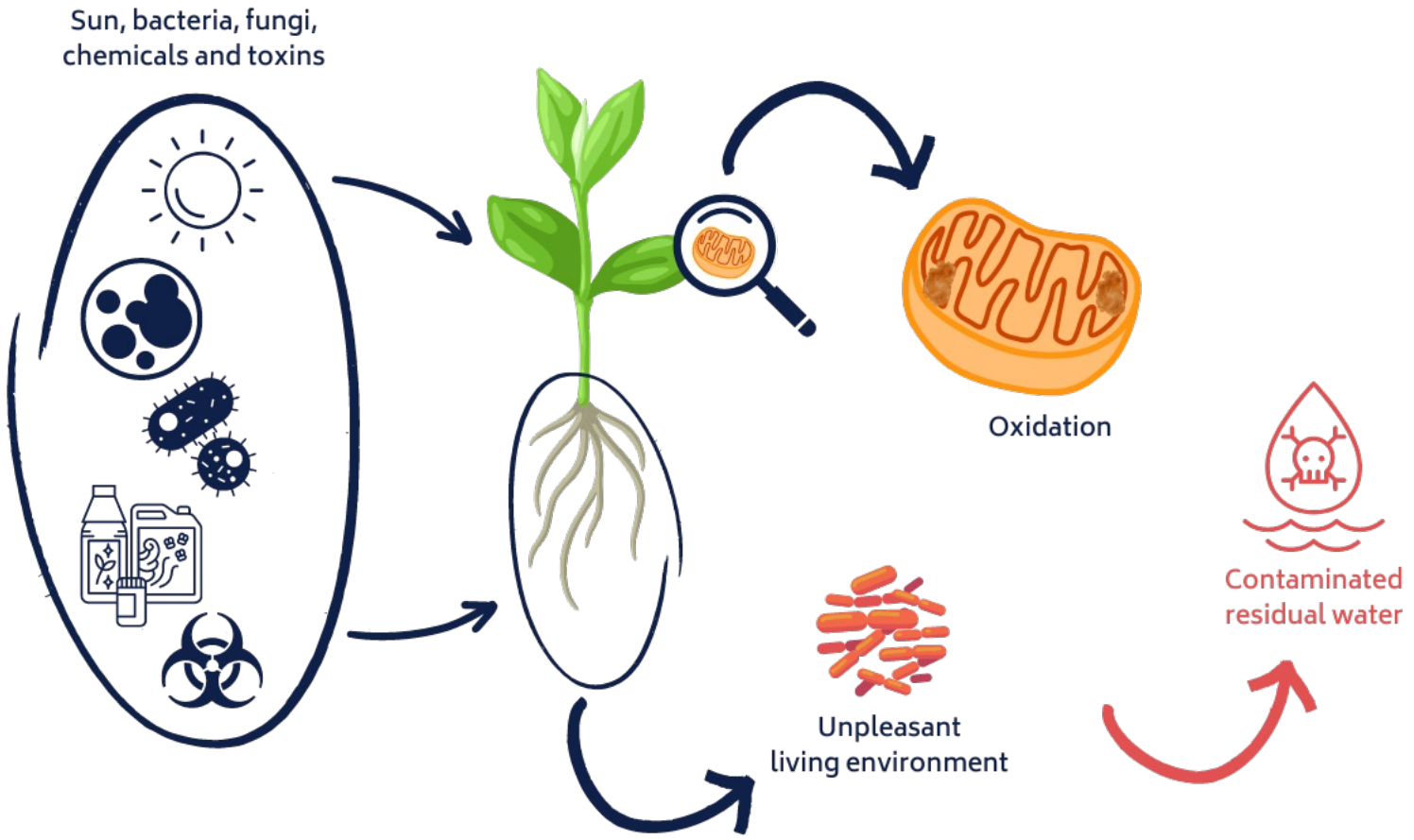
All life consists of a body with a microbiome that absorbs food and water and excretes residual substances. We are also all part of the same water system.

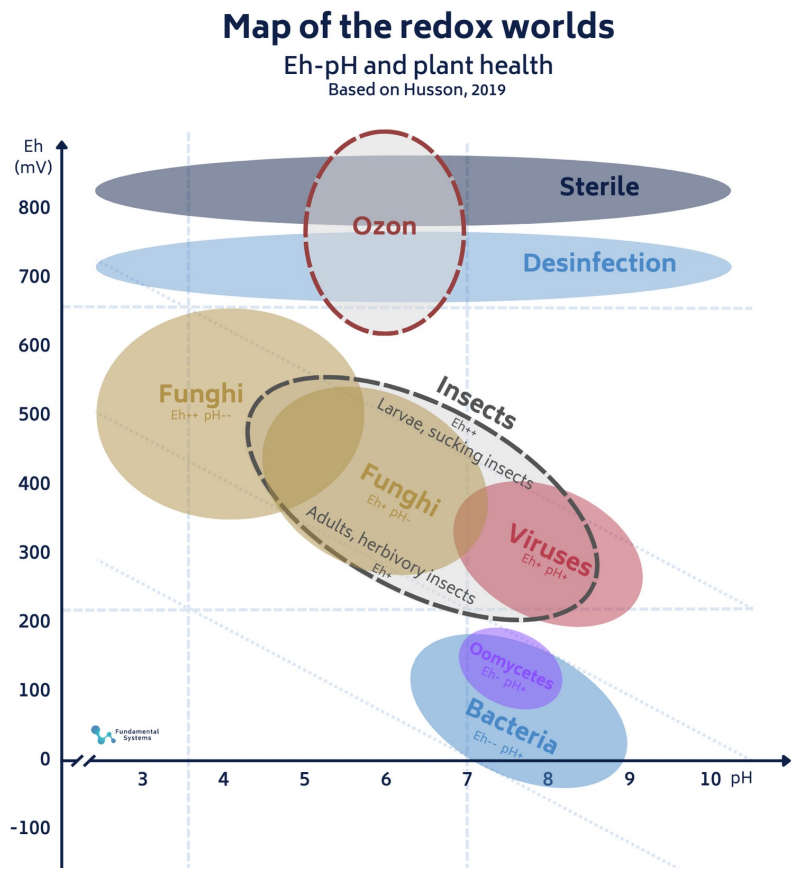
We focus on balancing regulated water systems with hydrogen and oxygen infused water.

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



Unhealthy stressors

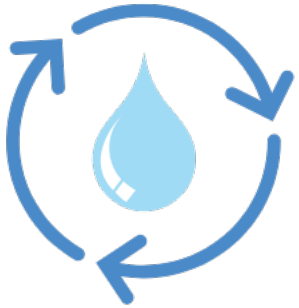




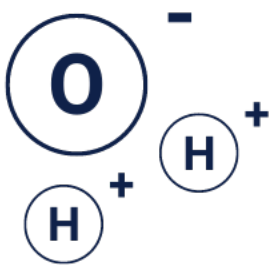
Our system infuses hydrogen and oxygen into water

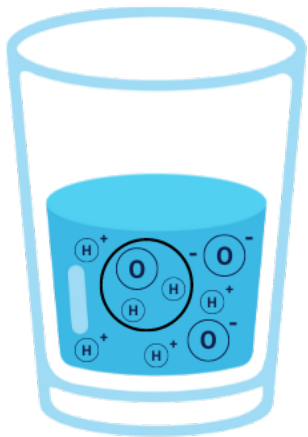
Pure water

Molecular dissect



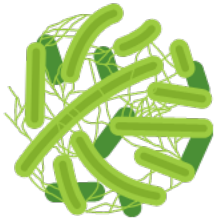
Oxygen and hydrogen



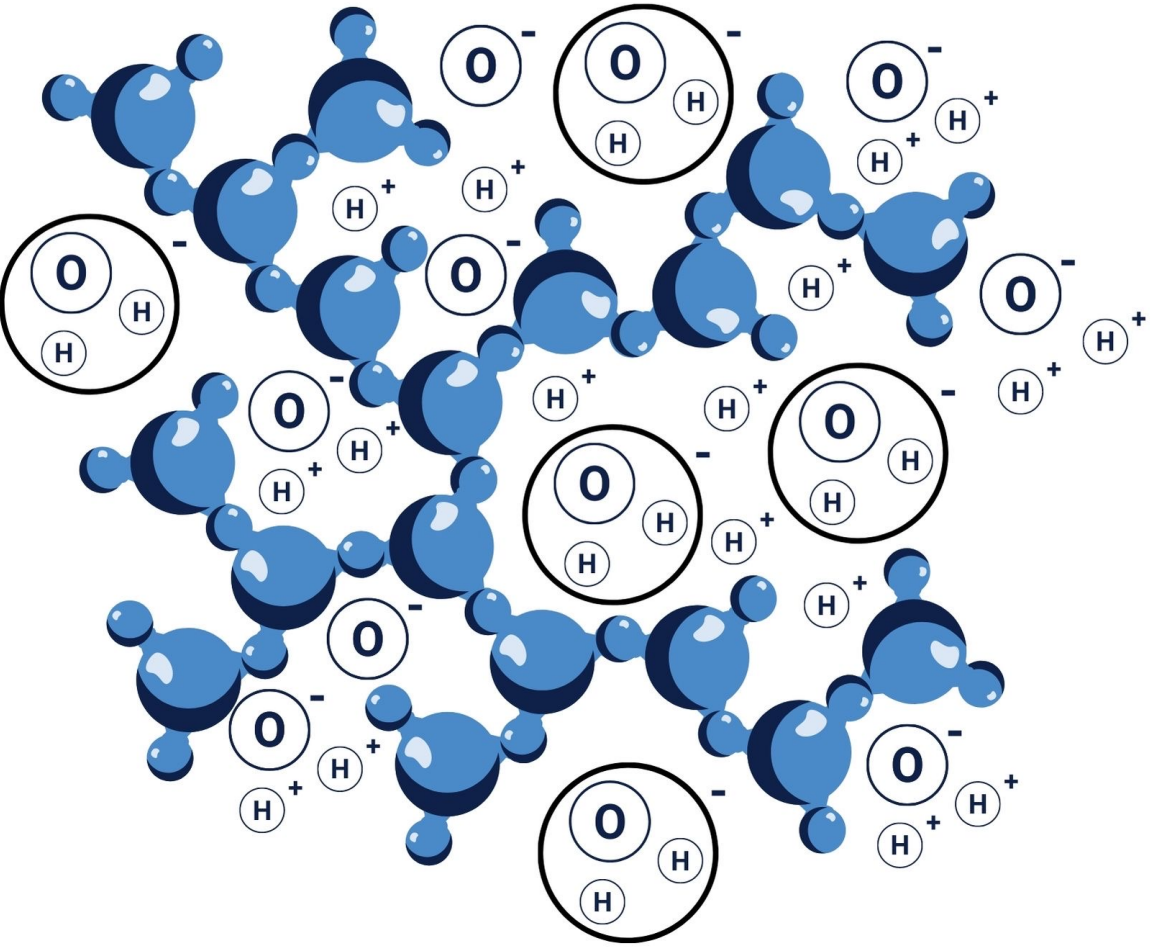


Dissolved and nano particles

Antioxidant



Invites good bacteria and other complementary organisms



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.

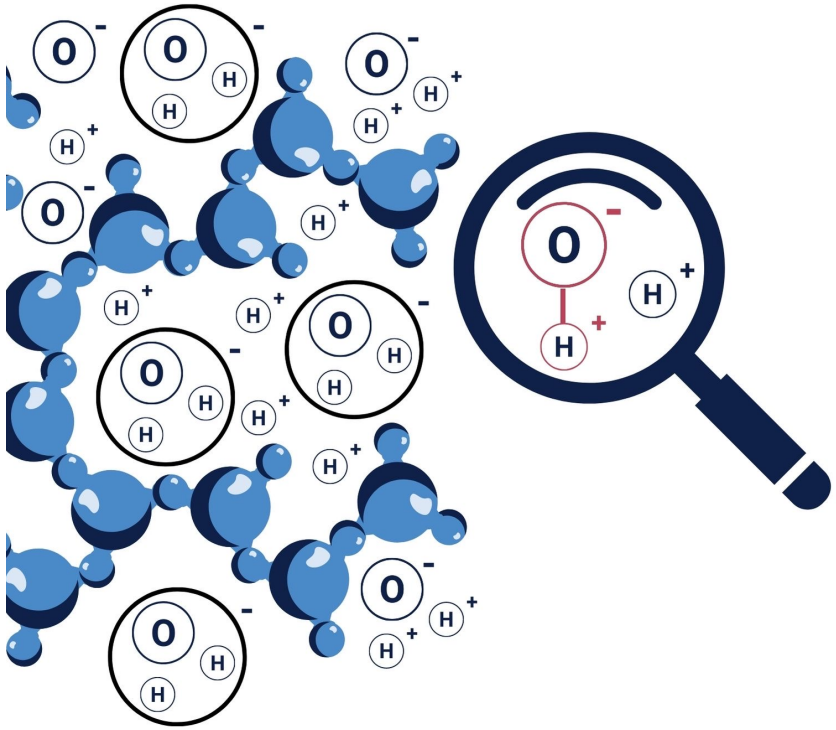
In addition, nano particles (80 Nm) allow us to add more hydrogen and oxygen and allow the molecules to travel further.

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

Oxidation

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

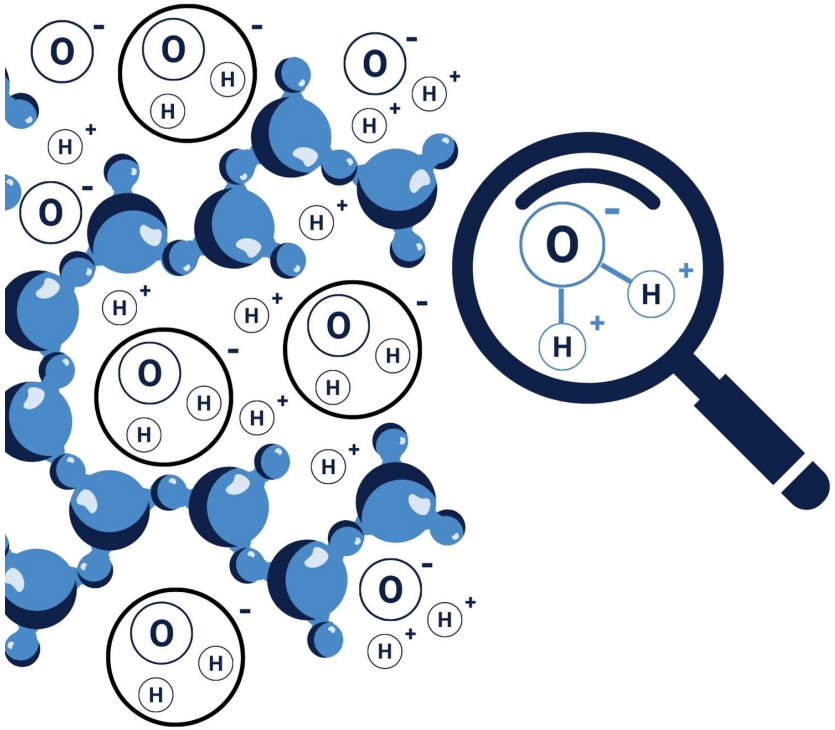
This is a free radical that can cause damage and this compound is irreversible.

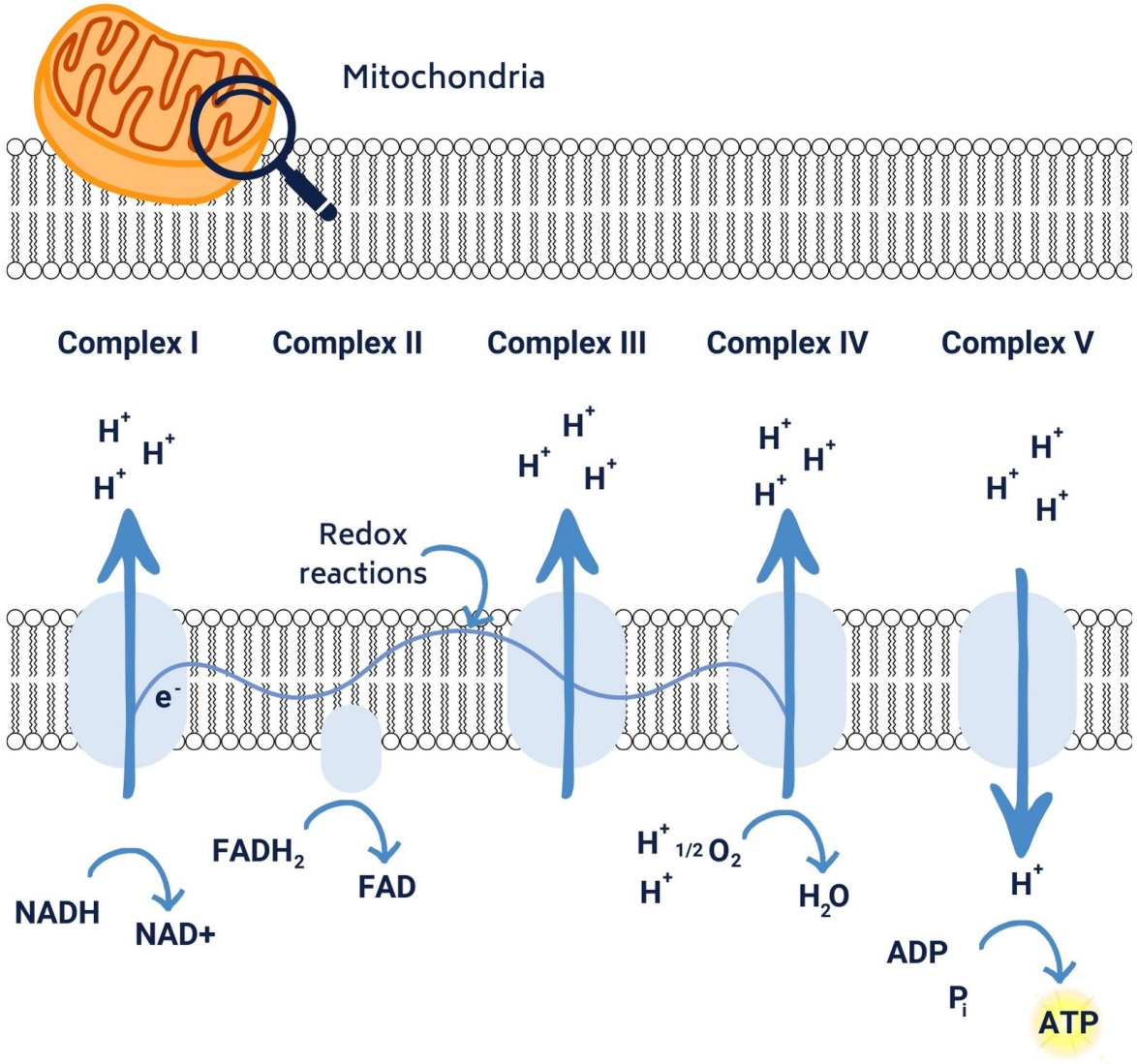


Hydrogen as antioxidant

Because there is sufficient hydrogen present, an H+ can bind to the free radical OH- and neutralize it by transforming into water (H2O). This reduces the oxidative stress.

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





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.

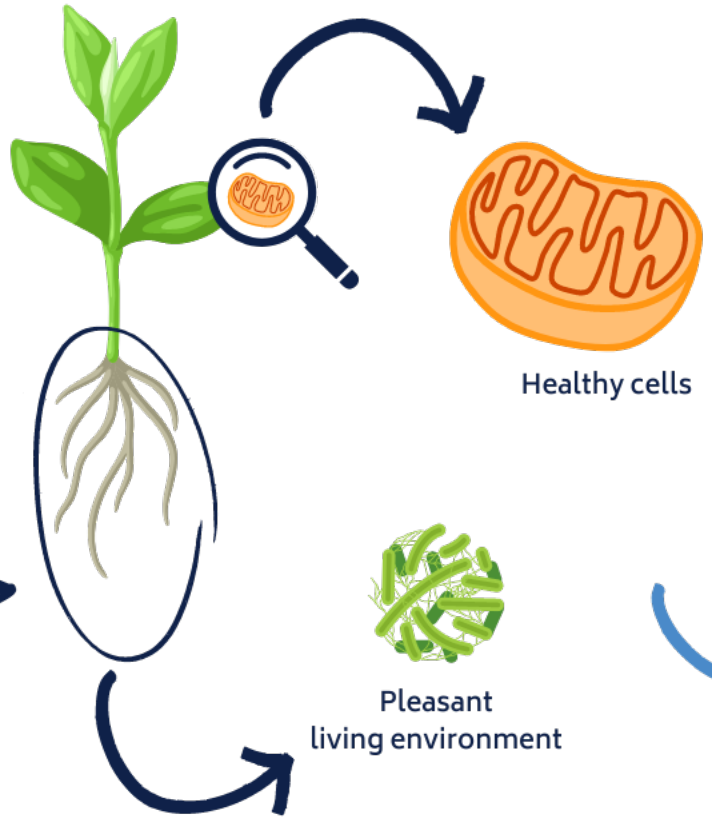
The processing of glucose into energy (ATP) takes place in the mitochondria. If an oxidative imbalance occurs, the mitochondria work less well and the cell can eventually die.

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

Effects of infused water

Rain and tap water with infused water



Healthy cells

Clean residual water

Pleasant living environment

The advantages

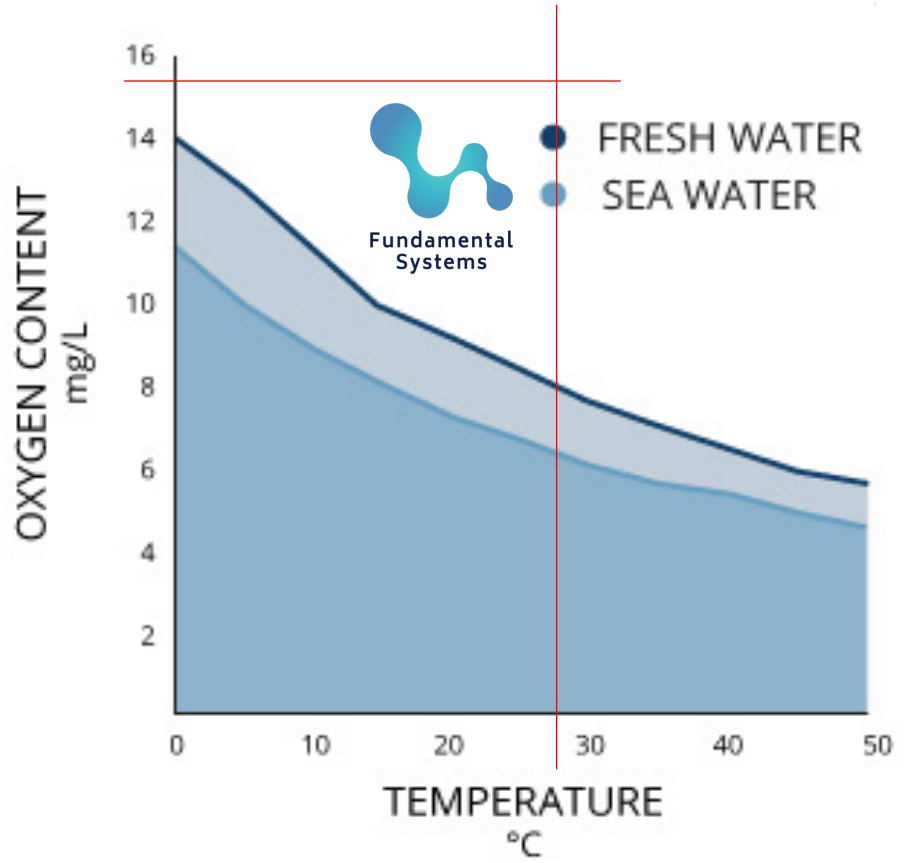
- Faster recovery from insufficient light
- Higher resilience
- Good bacteria and other complementary organisms in the microbiome
- Better absorption of nutrition, therefore less or no fertilizer is required
- Less or no chemicals and pesticides required

A healthy plant and circular water management

Effect of water treatment

- Temp 22,0
- DO 82.5 %
- DO 7.19 Mg/L
- SPC 1.03 -mS/cm
- C 0.98 -mS/cm
- PH 8.67
- PH –84.4 MV
- ORP 170.2.4

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



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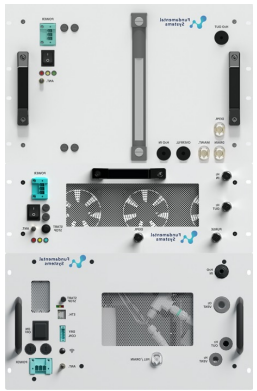

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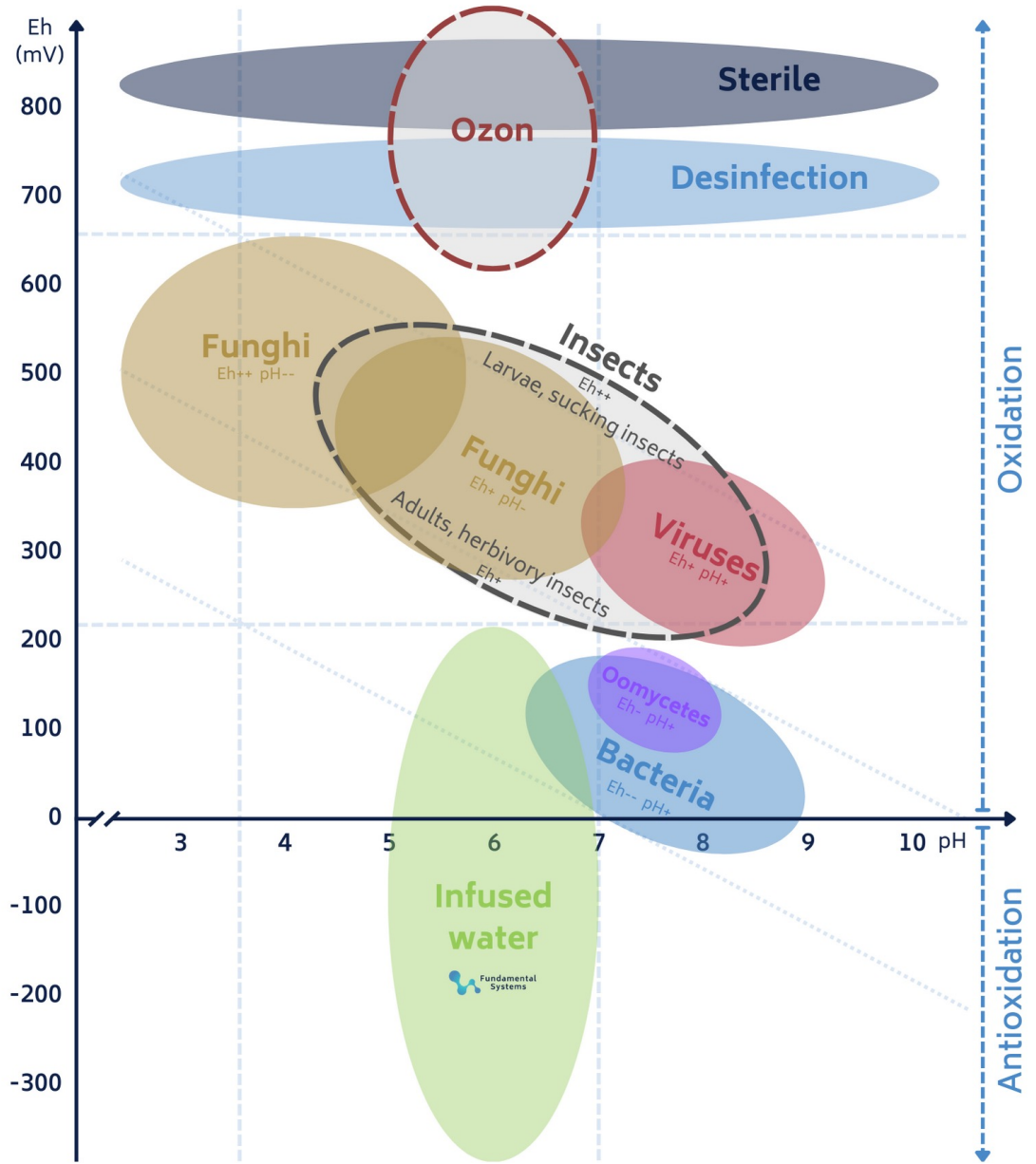
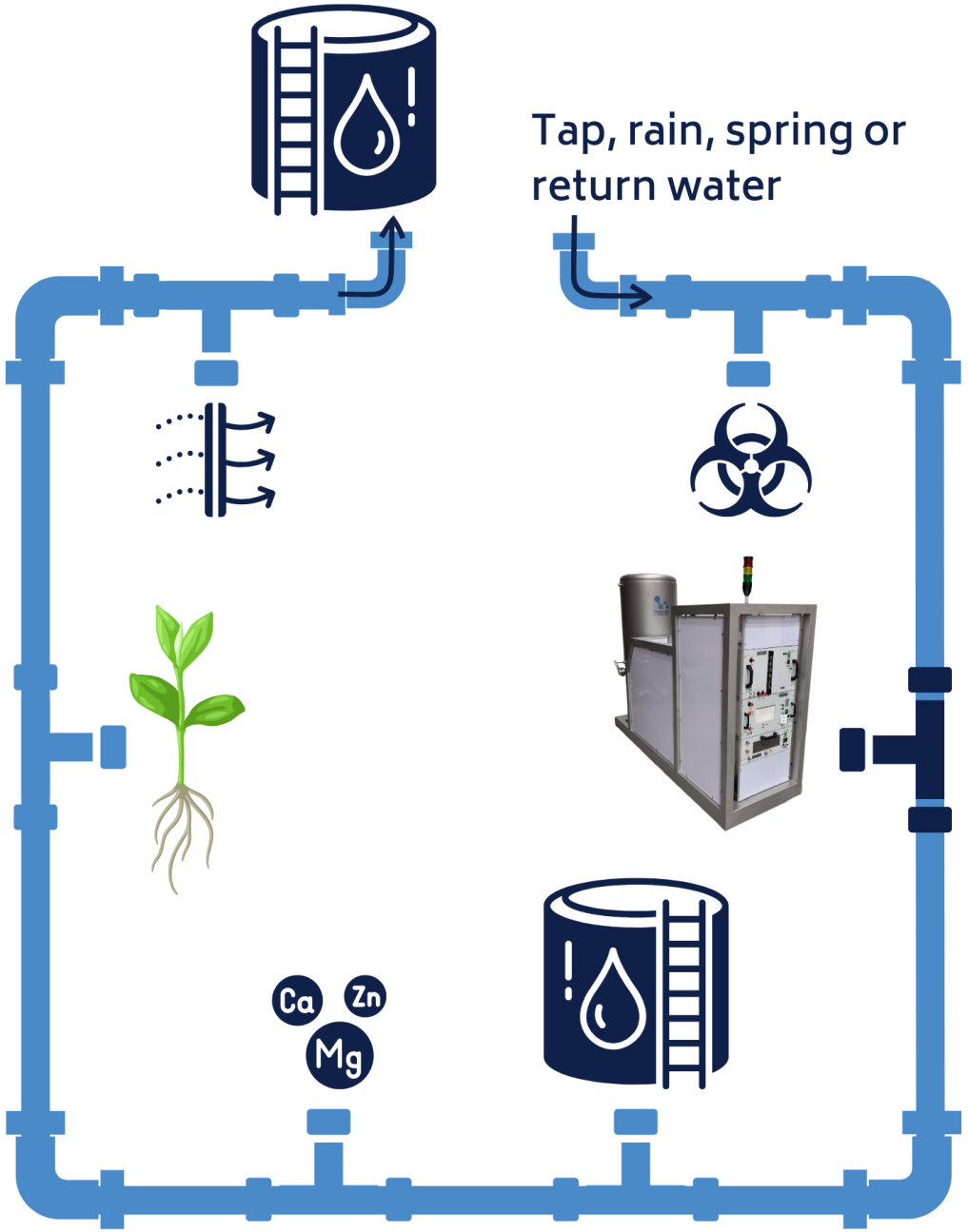
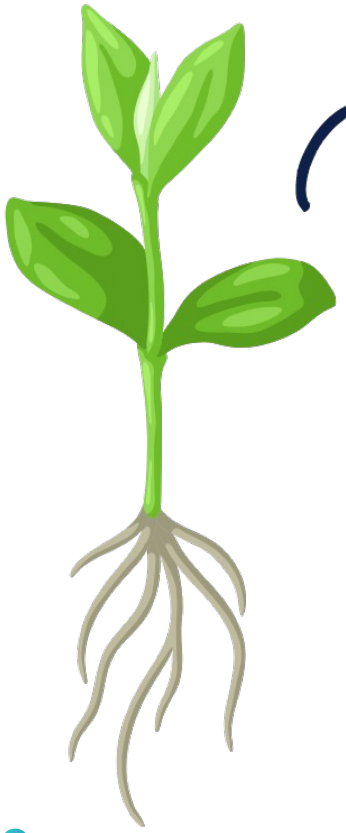


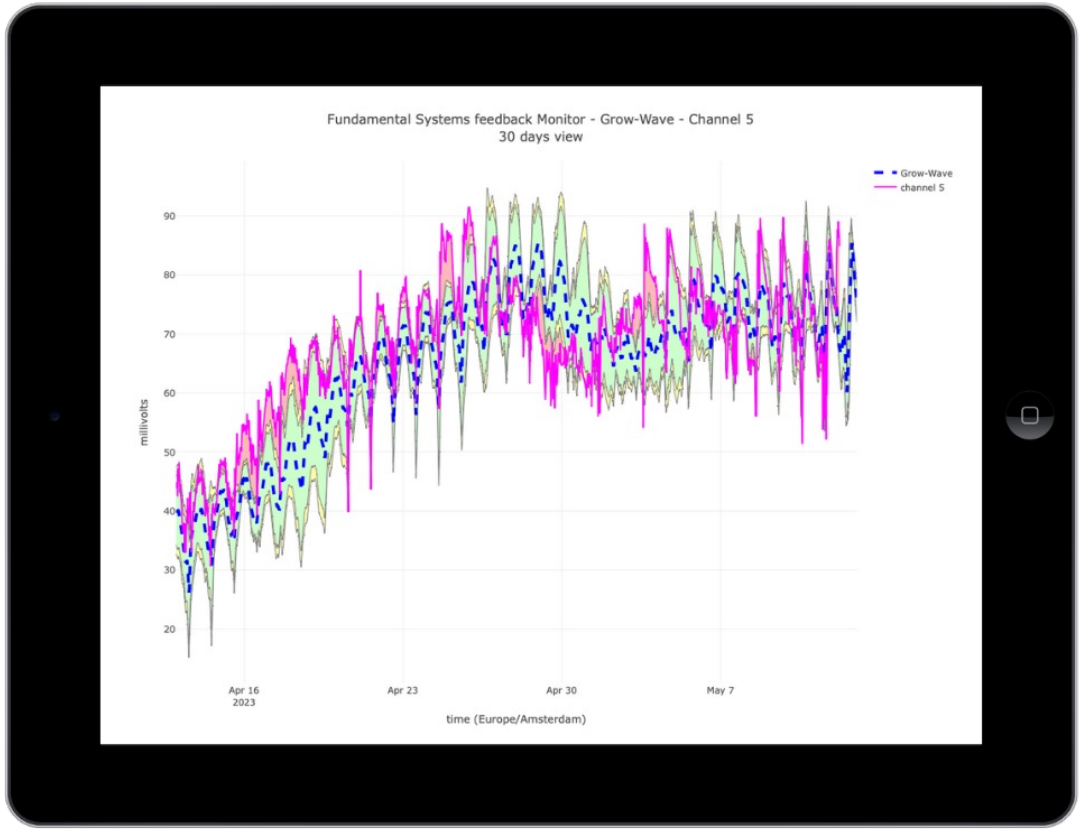


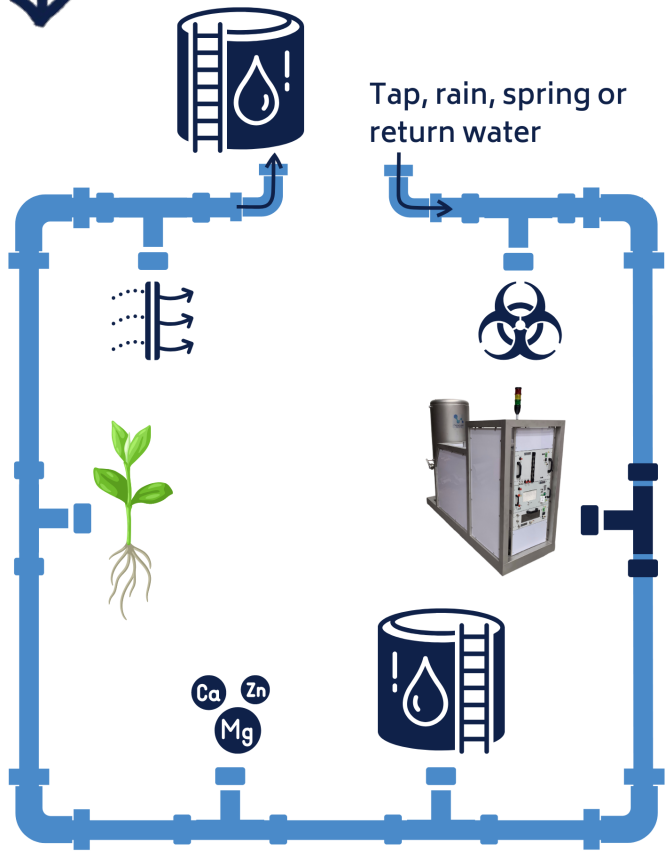
Integration of the system

- 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

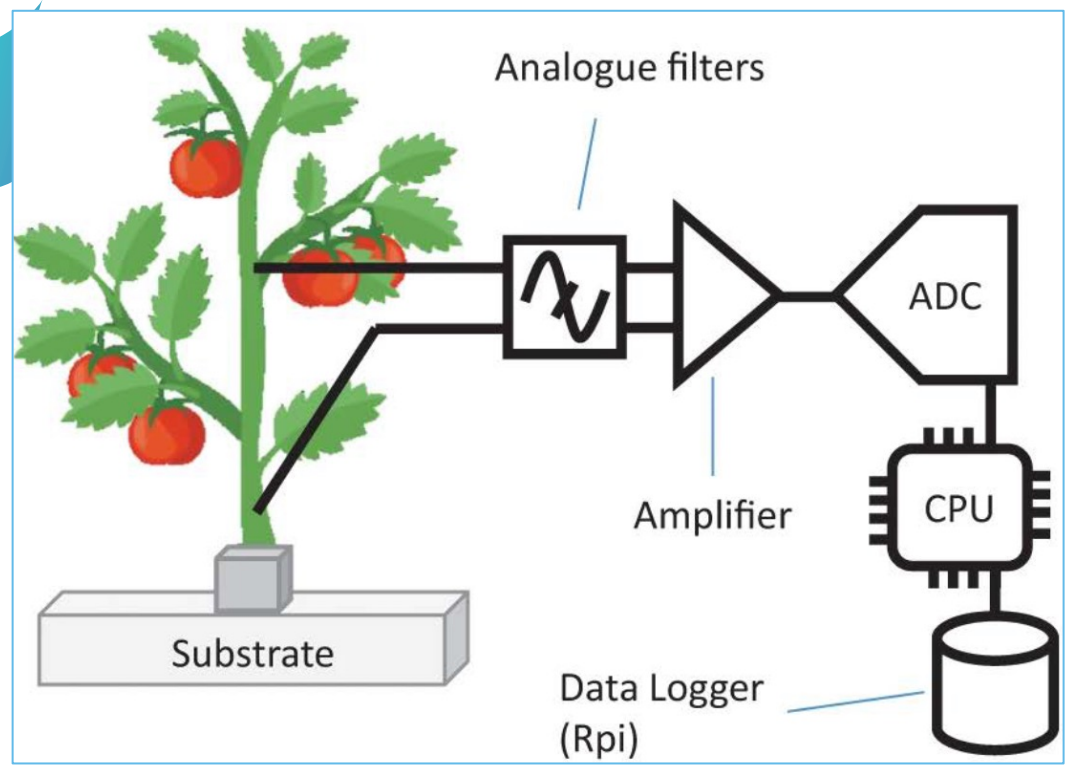
Possibility of real-time biofeedback

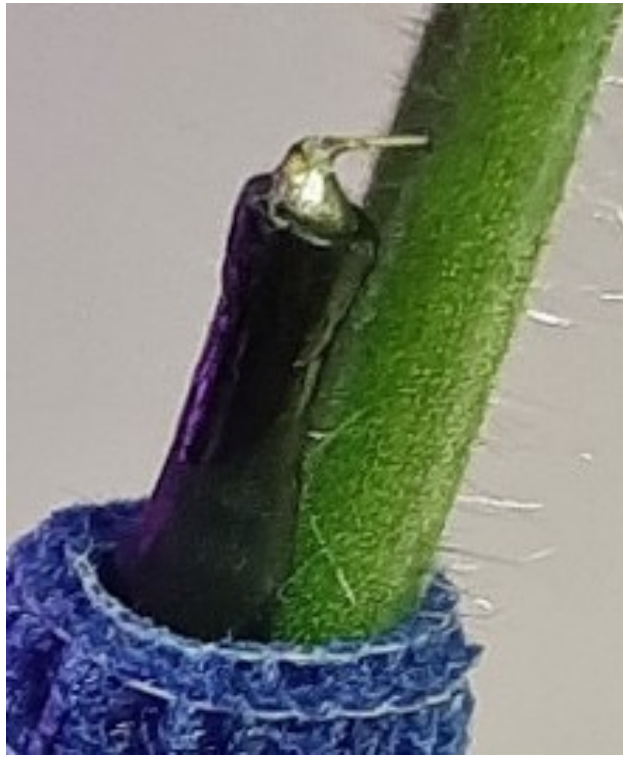




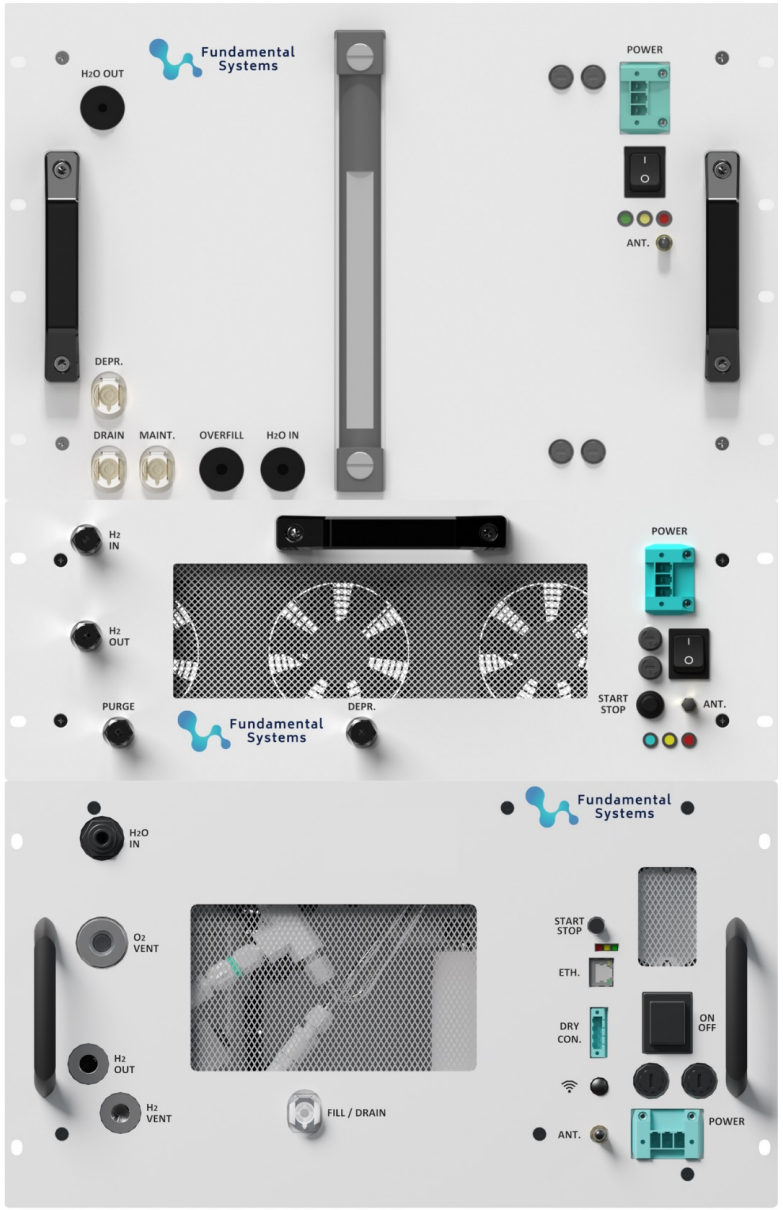


Biofeedback





Our systems



Modular system

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

Basic skid

Our basic skid infuses up to 5,000 liters per hour.

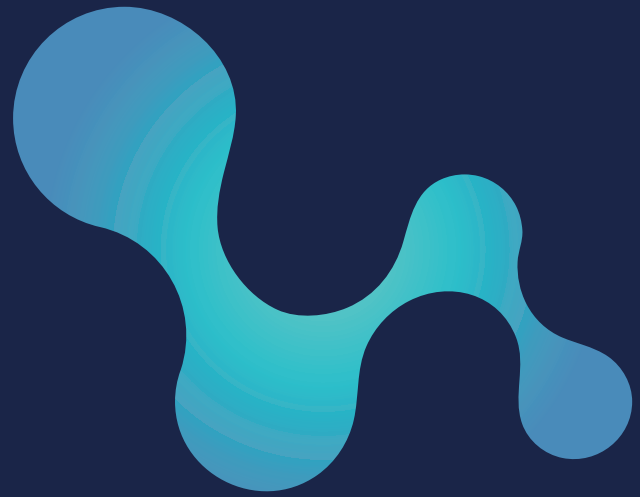
By expanding the system, one skid can infuse up to 30,000 liters per hour.

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

	Basic	Medium	Large
Liter per min	83	250	500
Liter per hour	5.000	15.000	30.000
Liter per day	120.000	360.000	720.000
Hydrogen l/min	0,5-1,0	1,5-2,0	3,0-4,0
Oxygen l/min	0,25-0,5	0,75-1,0	1,5-2,0
Primary PSI	85	90	100
Secundary PSI	15	20	30

Medical skid

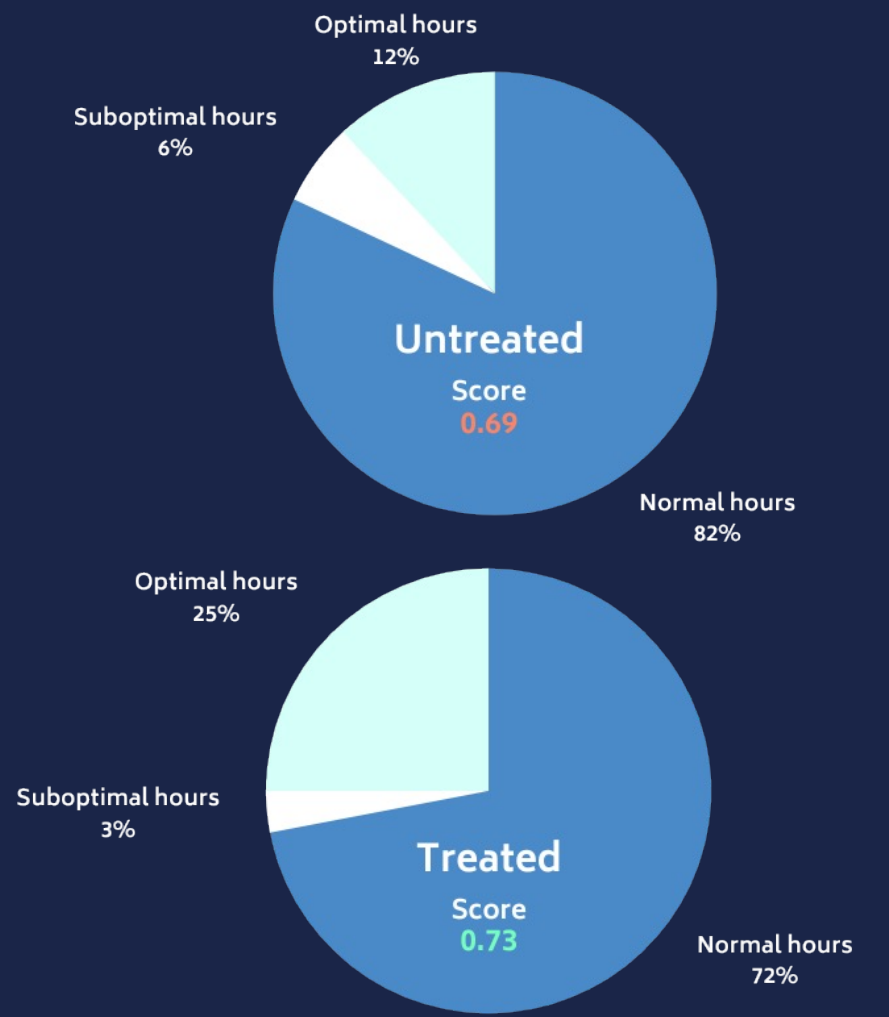
- Night therapy of short therapy sessions of 15 minutes
- Combination of inhaling hydrogen and oxygen with drinking infused water
- With a medical skid, 2 patients can receive hydrogen and oxygen therapy at the same time
- The skid is easy to move



Fundamental
Systems

Research


Fundamental
Systems


Optimal hours
12%
Suboptimal hours
6%
Untreated
Score
0.69
Normal hours
82%
Optimal hours
25%
Suboptimal hours
3%
Treated
Score
0.73
Normal hours
72%

Tulips

VERTIFY
EXPLOR&XPLAIN

Universiteit van Amsterdam

stowa

TESLA
connecting science, business and society

Findings tulip trial

Water

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

Root system

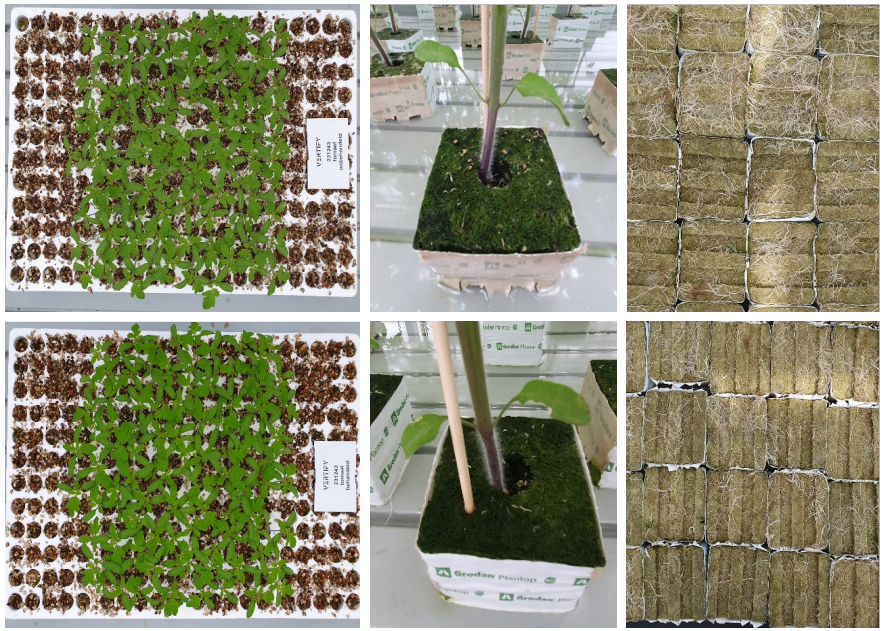
- Smaller root development
- White fresh roots
- More energy from bulb for growth

Tulip Strong Gold, Purple Prince, Silver Dollar

- 42cm long bulb size 10-11
- Weight 25 grams
- Weight per cm 0.61
- Root length 5 cm
- Sturdier leaf
- No cracks
- Dropout 0.8%

Current research

- Tomatoes and bell pepper
- Complete Life Cycle: from seed to harvest



VERTIFY
EXPLOR&XPLAIN

Untreated

Treated

VERTIFY
EXPLOR&XPLAIN

Untreated

Treated

VERTIFY
EXPLOR&XPLAIN

Untreated

Treated

VERTIFY
EXPLOR&XPLAIN

Biofeedback on Tomatoes and Peppers using infused water

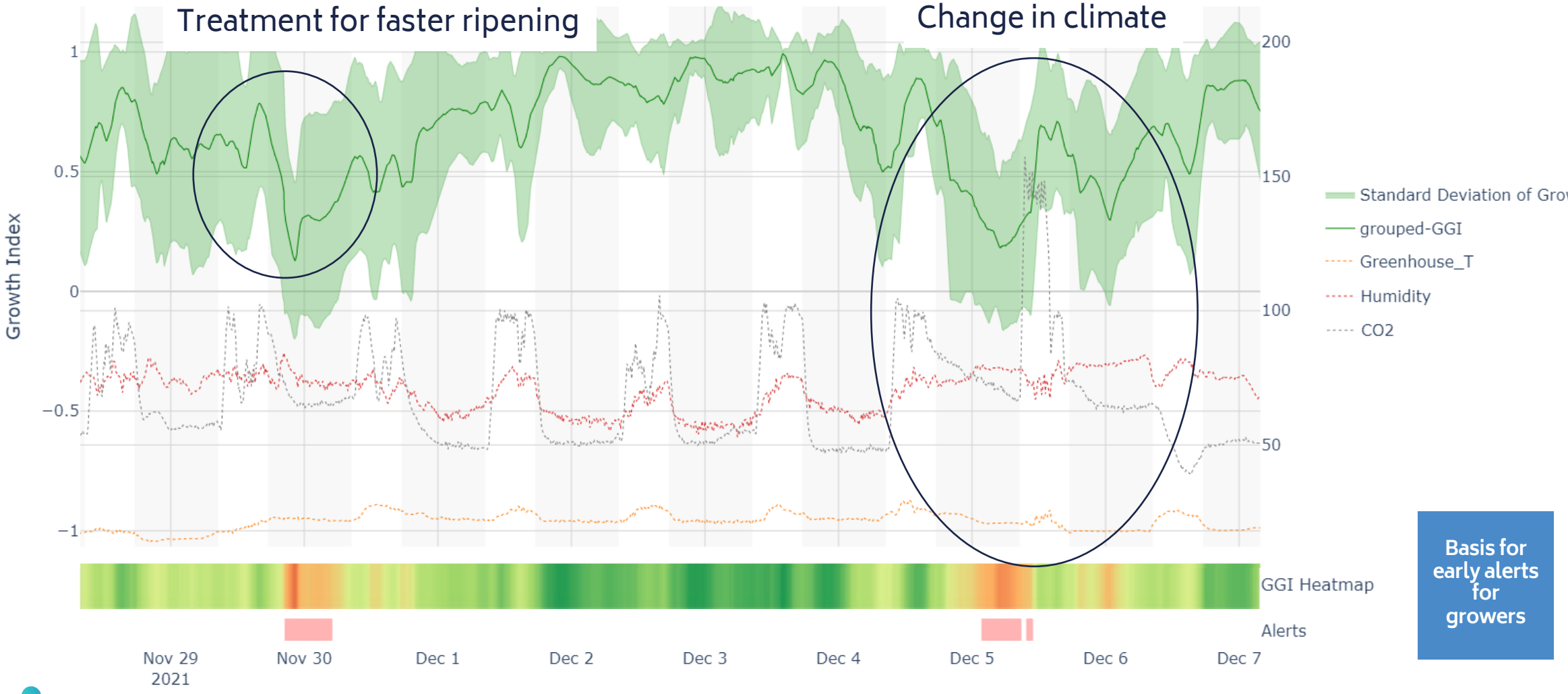
- Tomato sensors installed on 09.06.2023
  - Two sets: Treated vs. Untreated

- Pepper sensors installed on 21.06.2023
  - Two sets: Treated vs. Untreated

"Treated plants have a more stable plant rhythm, a stong link to big changes in climate" –Team Vivent

Vivent VERTIFY EXPLOR&XPLAIN UNIVERSITEIT VAN AMSTERDAM

Grouped Growth Index (GGI)

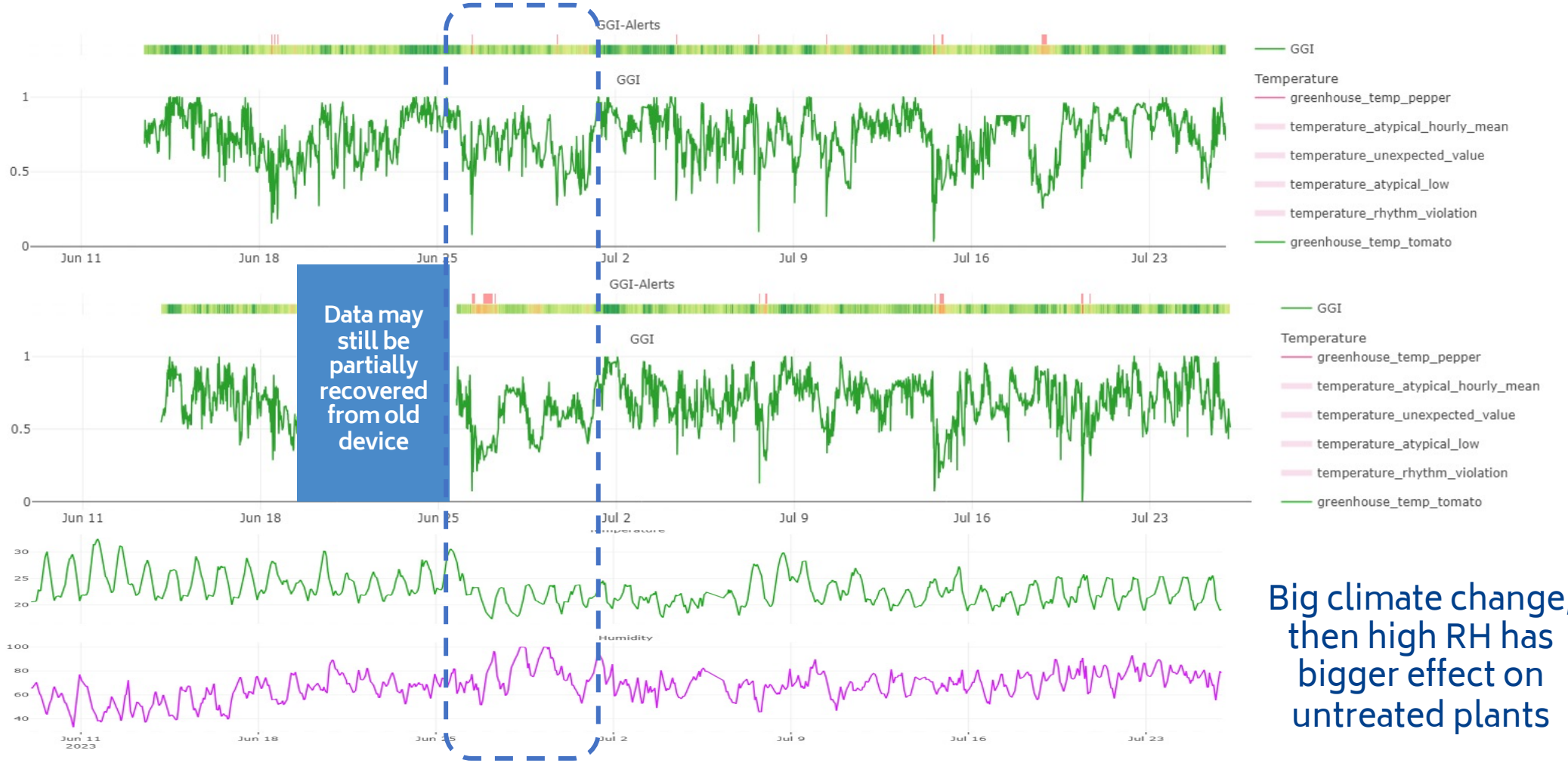


Basis for early alerts for growers

Plant rhythm zoom-in tomatoes

Treated

Untreated

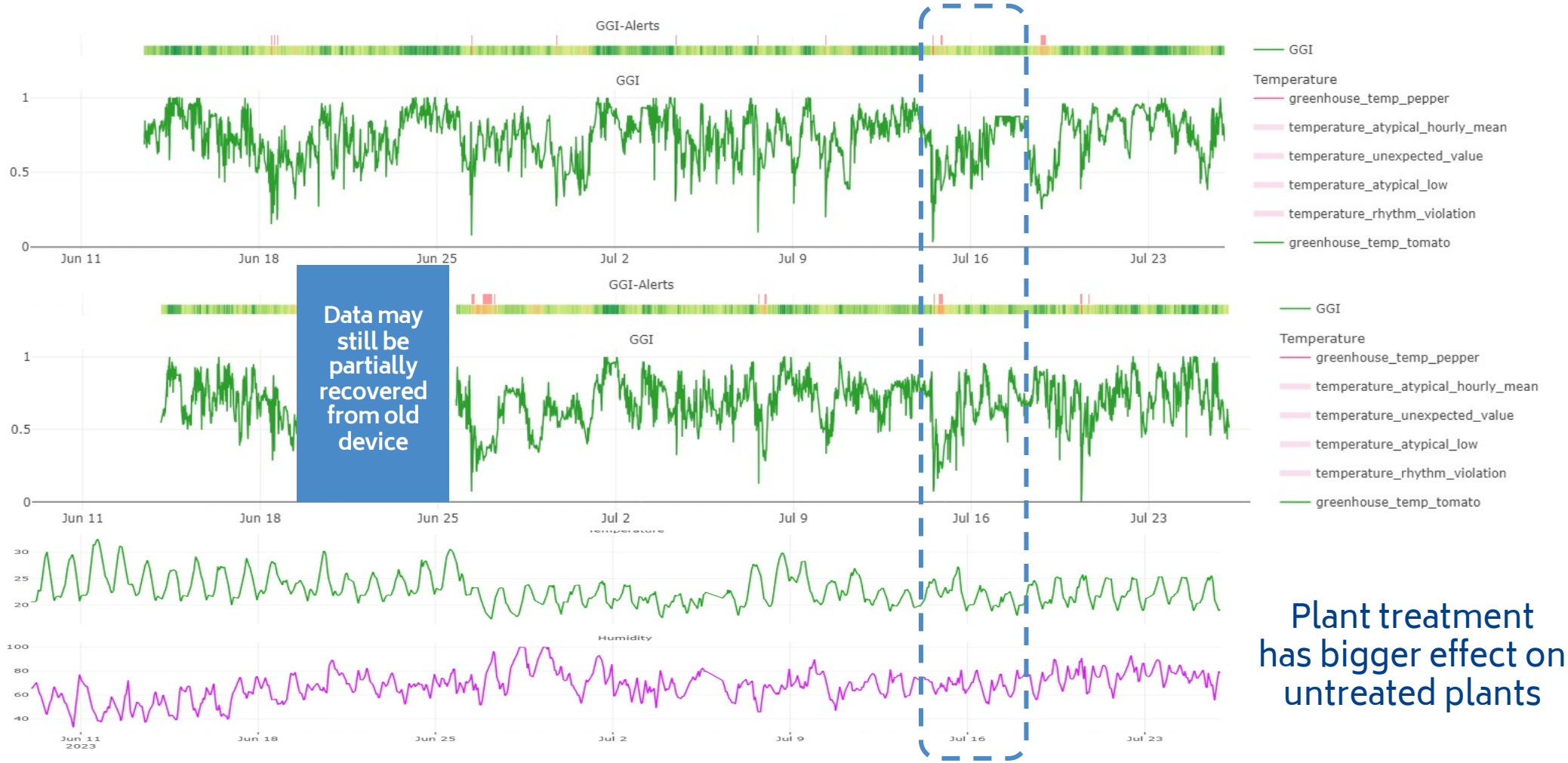


Big climate change, then high RH has bigger effect on untreated plants

Plant rhythm zoom-in tomatoes

Treated

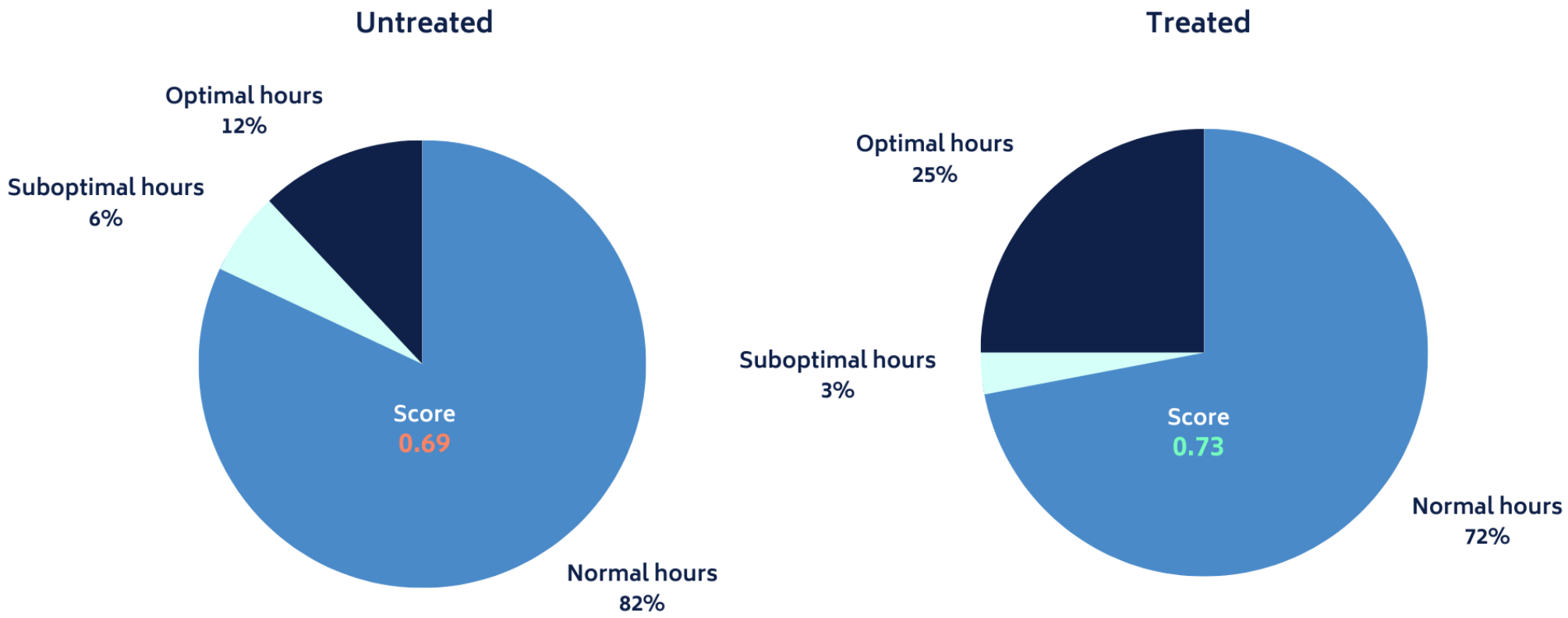
Untreated



Plant treatment has bigger effect on untreated plants

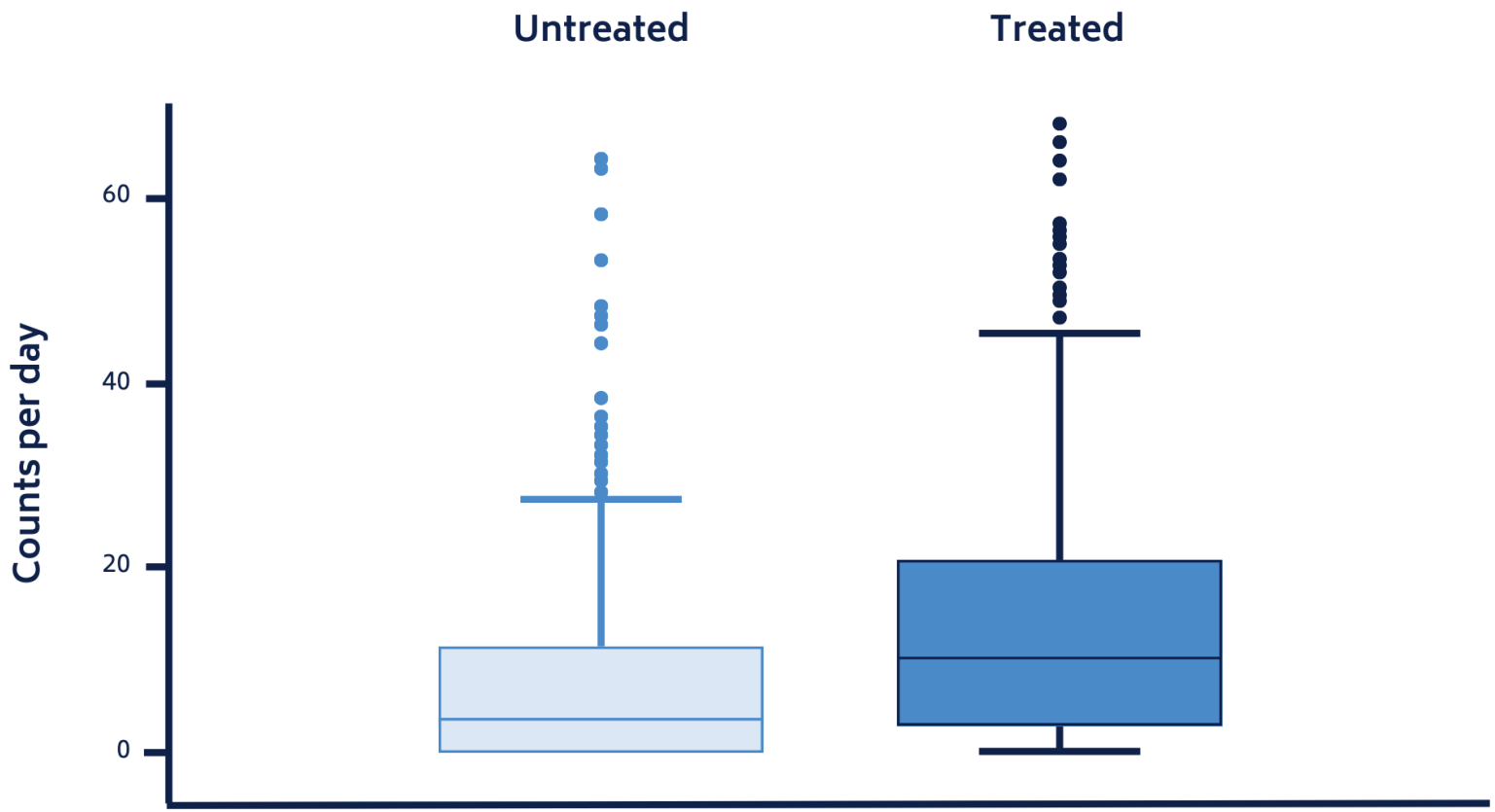
Plant rhythm score for tomatoes

Treated plants have a more stable plant rhythm



Activity profile for tomatoes

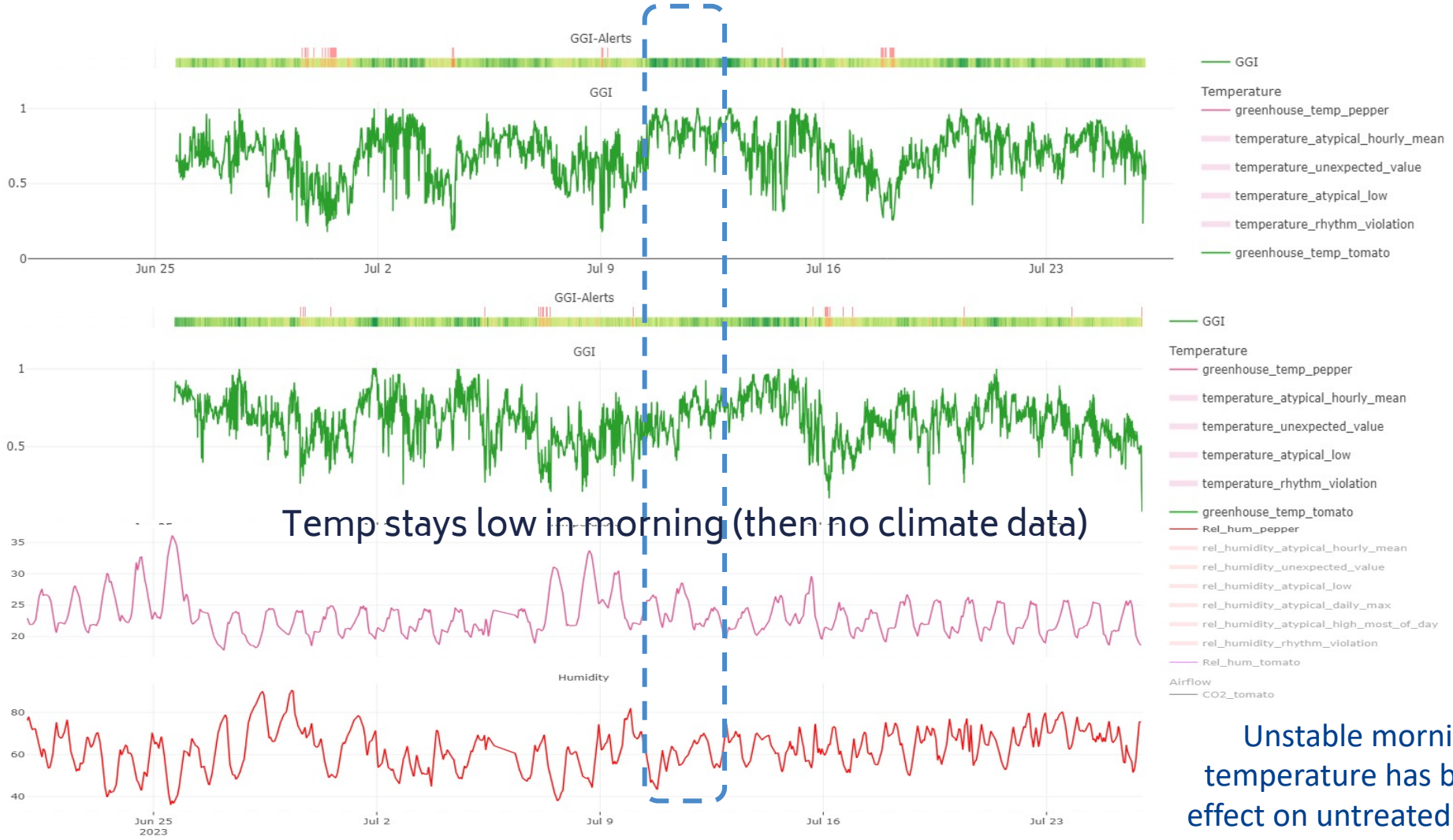
Treated tomato plants are more active



Plant rhythm zoom-in peppers

Treated

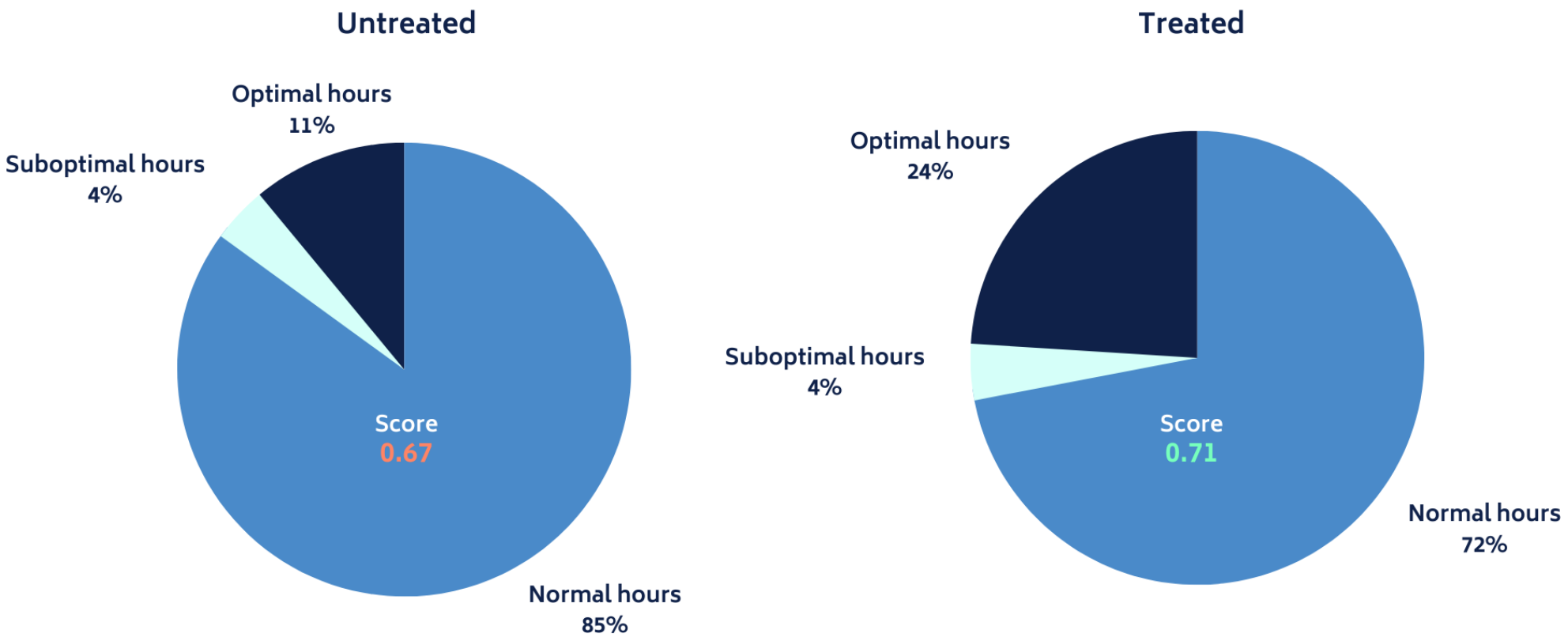
Untreated



Unstable morning temperature has bigger effect on untreated plants

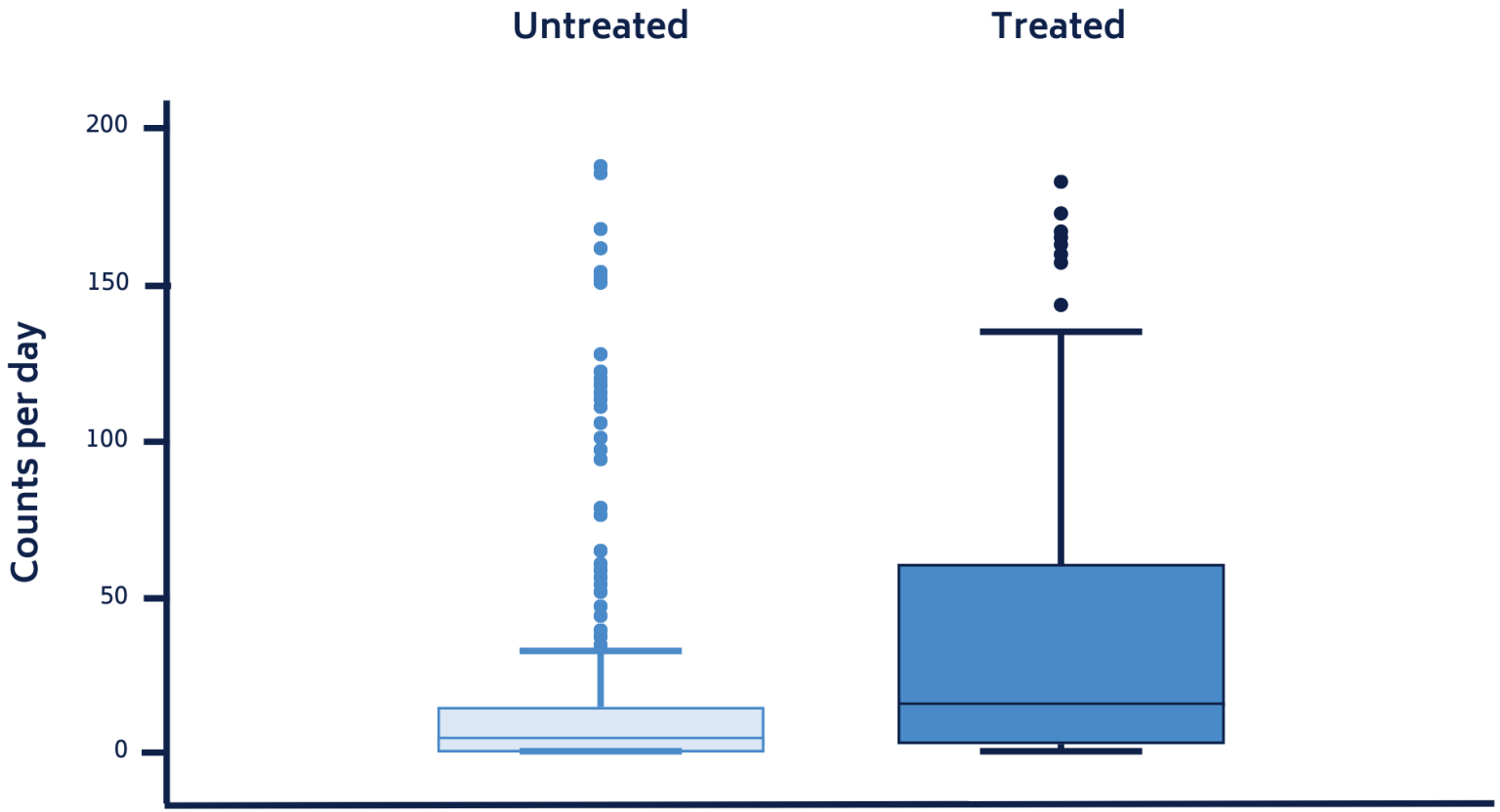
Plant rhythm score for peppers

Treated plants have a more stable plant rhythm



Activity profile for peppers

Also here,
treated pepper plants
are more active



Key takeaways

- Treatment helps in reducing plant response to stressors and changes in climate and stressors: they gain higher resilience

- Treated tomato plants
  - Have a more stable plant rhythm
  - Show higher activity

- Treated pepper plants
  - Have a more stable rhythm
  - Are more active, changes from mid July

Key takeaways

In the treated plants, we saw a higher

- Nutrient index balance
- Photosynthetic activity
- Yield per plant in kilograms

And they required less

- Chemical intervention
- Plant protection products

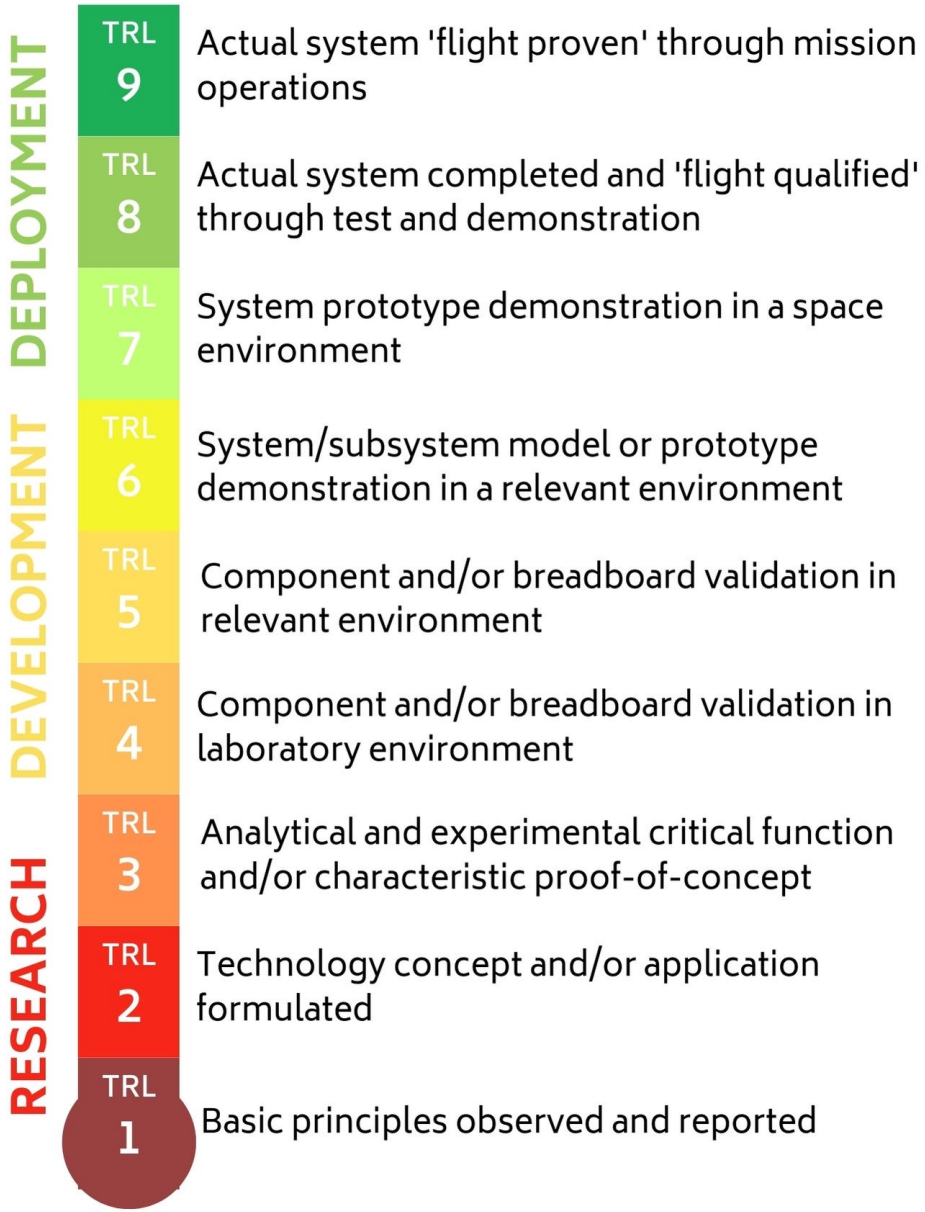
No negative effect was found from water infusion on the

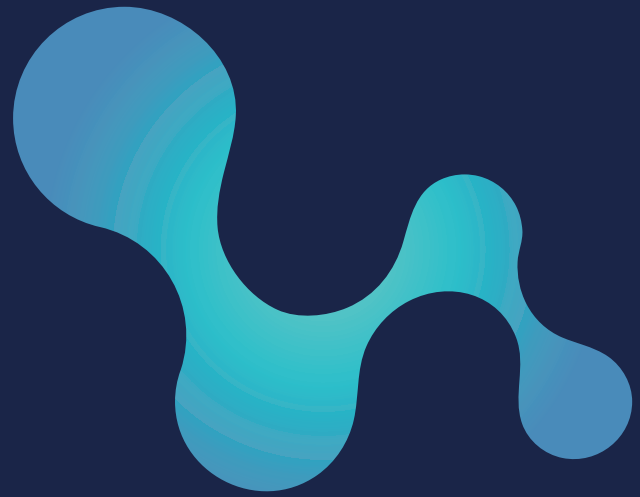
- Plant
- Microbiome around the roots
- Water balance
- Composition of nutrients

TRL 7, 8 and 9

We are demonstrating, testing, developing and launching our systems.

Our products are designed and assembled in The Netherlands. Further more, they comply with all relevant European standards and regulations.





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Systems