



EVJA: ABOUT US

OFFICES: Naples, Italy and Wageningen, Netherlands

CUSTOMERS: 100+ (300+ sensor node devices)

MONITORED FARMLAND: 1000+ HA horticulture.

MARKETS: active in all main horticultural (leaves, tomatoes, berries, potatoes, etc.)

GEOGRAPHIES: present in 9 countries, 4 continents.

PATENTS: 4 approved, of which 3 WIPO granted.



INVESTORS



PARTNERS & PROJECTS



Consiglio Nazionale
delle Ricerche



EVENTS AND AWARDS



KEY ASSETS



Software platform

- IoT device managements
- NoSQL database
- Microservices architecture
- Progressive WebApp



Agronomic algorithms & models

- Predictive models of Diseases and Harvest
- Agronomic and Climatic Algorithms
- AI: Machine learning
- Test field for Validations and Calibrations



Data Collection and Analysis

- Micro-Climate Data
- Weather Data
- Field monitoring Data



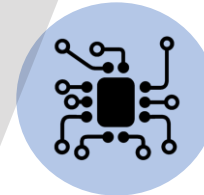
Agronomic Technical Services

- Training courses
- Manuals & Guides
- Remote Assistance & Support



Wireless Sensor Networks

- Sensor Nodes
- COTS Device Customization
- Network design & deployment
[Patent Approved]



Electronics

- Design, prototyping and industrialization
- Fully Wireless proprietary micro-board
[Patent Approved]



Mechanics

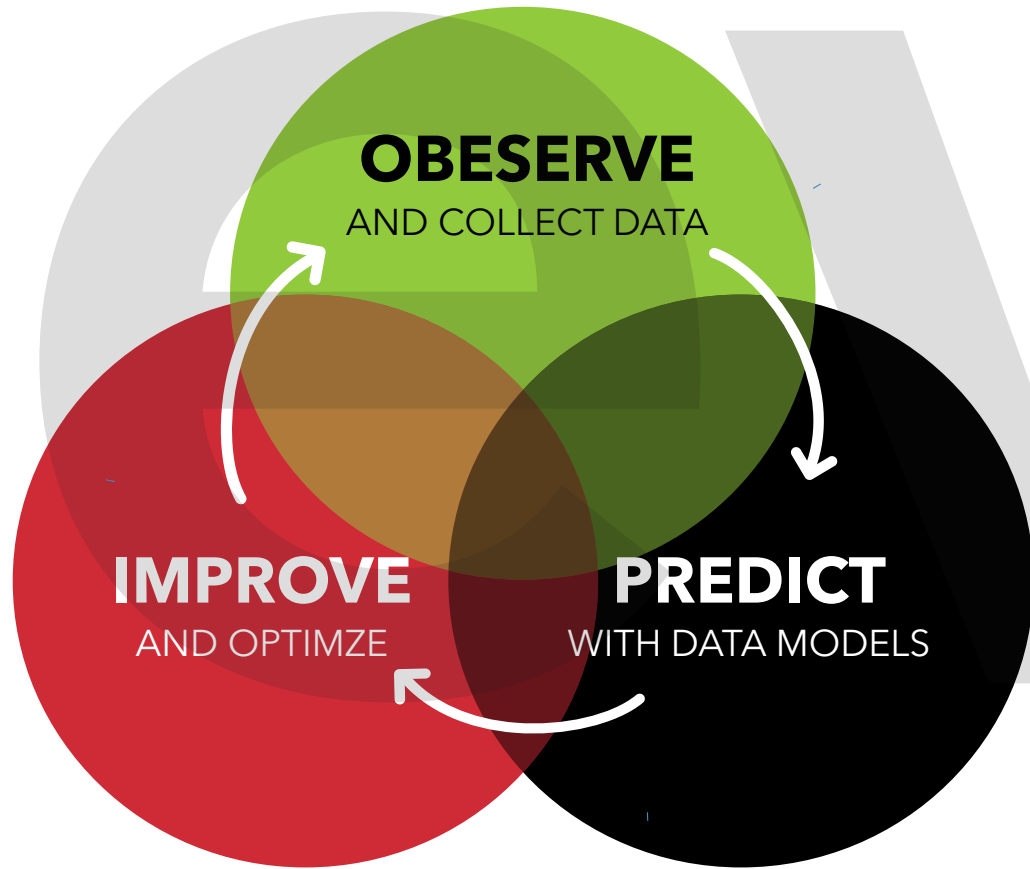
- Design, prototyping and industrialization
- Custom telescopic-rotating Arm Holder



Operations

- Assembly and Testing
- Inspections & Installation
- Field repairing and intervention

SUPPORT MAKE THE BEST AND MOST SUSTAINABLE DECISIONS



opi



**WATER
MANAGEMENT**



**NUTRITION
OPTIMIZATION**



**IMPROVED EFFICIENCY
OF AGROCHEMICALS**



YIELD PREDICTION

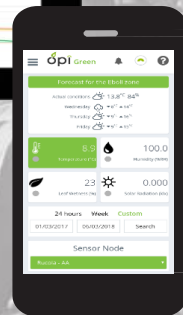


OPI DECISION SUPPORT SYSTEM

The OPI Decision Support System (DSS) developed by Evja is a hardware and software bundle based on a proprietary Wireless Sensor Networks:

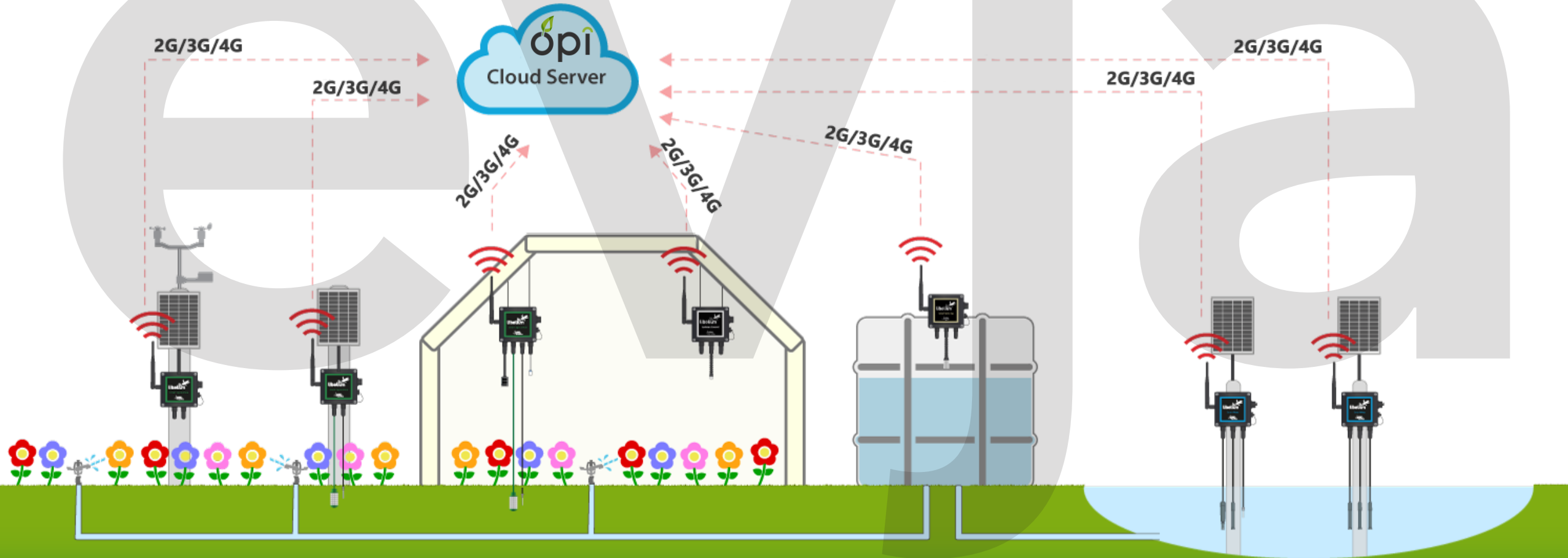
- The **Sensor Node devices** collect Climate, Pedoclimate and Weather data, via special sensors.
- The collected data are wirelessly sent to OPI platform by consuming **APIs** via **cellular network**
- The data are stored and aggregated by our **Data Processing Engine** for processing and calculations.
- The data by mean the **responsive web portal**, accessible by any desktop or mobile device.





OPI WIRELESS SENSOR NETWORK

Each Sensor Node device is directly connected to EVJA's cloud servers via **cellular network** (2G/3G/4G/5G). They have a direct connection to **OPI Cloud Platform** by consuming **our APIs** by means cellular data transmission.



OPI SENSOR NODE: MAIN FEATURES

Energy independent

The internal battery is recharged by a small solar panel.

Very low-power consumption

Work for weeks even in case of lack of battery charging.

Internal Memory

Avoid the loss of acquired data in case of network communication interruption.

Connectivity

Secure internet connection via Cellular network.

Wi-Fi, NB-IoT, Sigfox and LoRa versions are also available.

Geolocalization & Motion

Keep track of the position and every movement of your device on field thanks the GPS-GLONASS-GALILEO receiver module and internal Accelerometer and Gyroscope.

Remote upgrade and maintenance

Remote firmware upgrade and Built-in test equipment for remote fault diagnosis.

Robust waterproof chassis

The enclosure meet the standard UL 746 C) with ingress protection IP65 and impact resistance IK08 to ensure full performance also in outdoor and moving applications.



CE FC

IC 

OPI SENSOR NODE: INSTALLATION ON FIELD

Comfortable mounting

The device comes with a convenient mounting kit: Arm, Pole or Tripod with special holders and brackets.

Easy installation

Turn it on and go live thanks to remote configuration and customization.

Internal Memory

Avoid the loss of acquired data in case of network interruptions.

No Software Setup

System ready and accessible upon user login. Only an internet browser and internet connection are needed.

Support & Maintenance

Fast support and easy maintenance, thanks to:

- Convenient connectors to add or replace sensors
- Built-in test equipment for remote fault diagnosis
- Remote upgrades
- Customer Support by phone, email and WhatsApp



OPI SENSOR NODE: INSTALLATION ON FIELD



OPI SENSOR NODE: iGUESSMED TRIAL FIELDS INSTALLATION



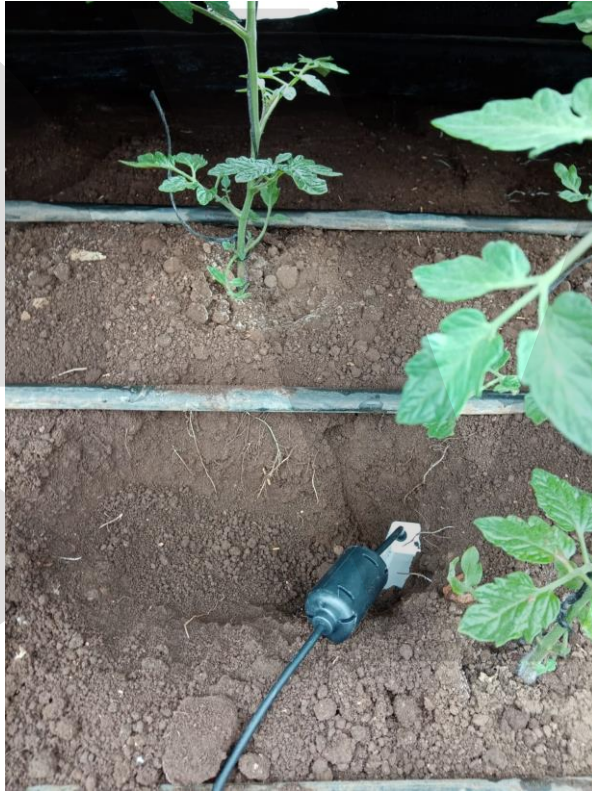
OPI SENSOR NODE: iGUESSMED TRIAL FIELDS INSTALLATION



OPI SENSOR NODE: iGUESSMED COMMERCIAL GREENHOUSE INSTALLATION

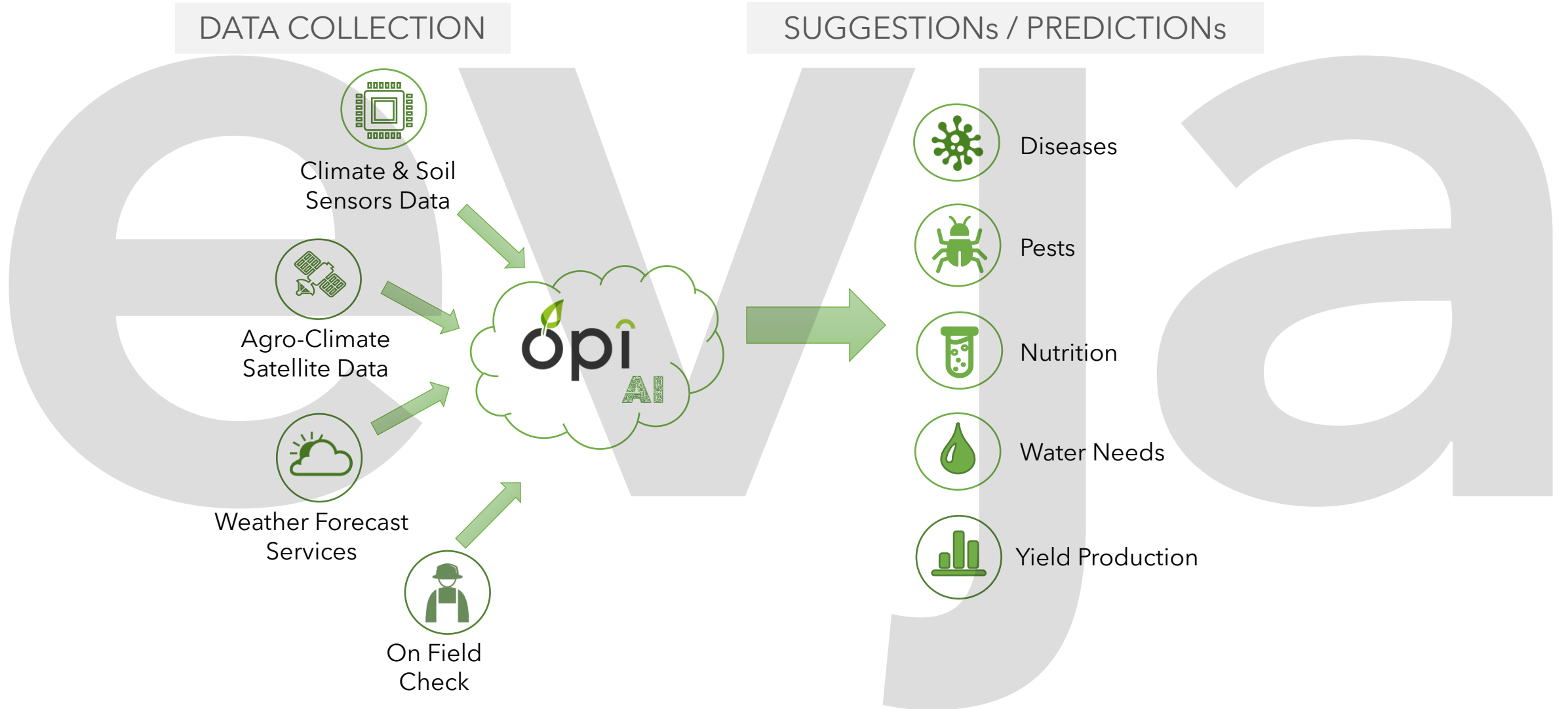


OPI SENSOR NODE: iGUESSmed COMMERCIAL GREENHOUSE INSTALLATION





OPI DATA COLLECTION



OPI Platform: Main Features

Crop Stats



- Data every 15/30 mins
- Averages and Statistics



Weather forecast for comparison at-a-glance



Alert from the Field



Maps Integration & Device Geolocation



Shared Calendar for daily field operations

Custom Alerts



- Thresholds for Real Time alerts
- Email and Web notifications

Agronomic Data Analysis



- Real time and hystorical analysis
- Compare and analyze your trends



Customizable Profile for Enhanced Access



Data and Charts Export



Cross Platform Web Application



Clean and Product-specific User Interface



Cloud Platform whenever-whenever accessible



- **Pathogen models:**

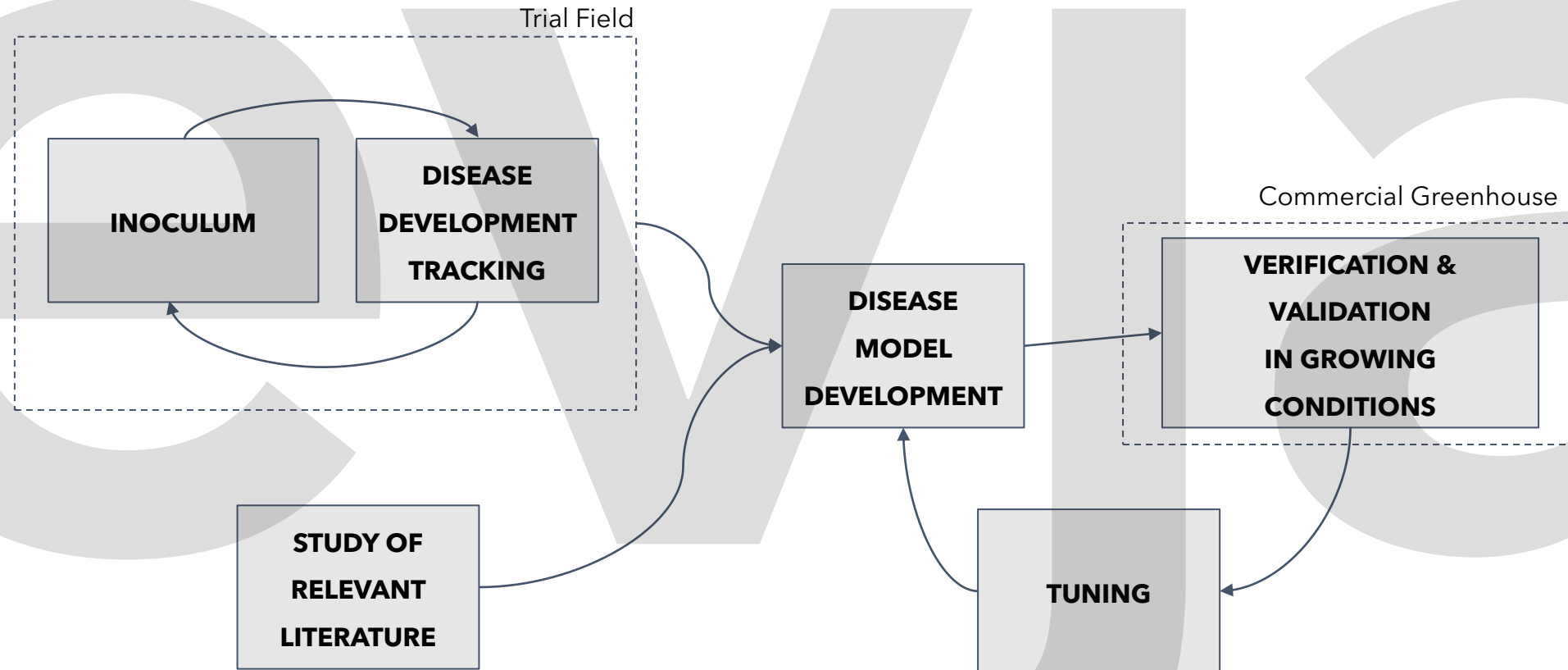
- *Alternaria*
- *Botrytis*

- **Greenhouse climate control algorithms**

- **Fertigation models:**

- Water requirements: *PrHO*
- Fertigation in soil: *VegSyst*
- Fertigation in soilless cultivation: *SimulHydro*

PATHOGEN MODELS DEVELOPMENT PATH

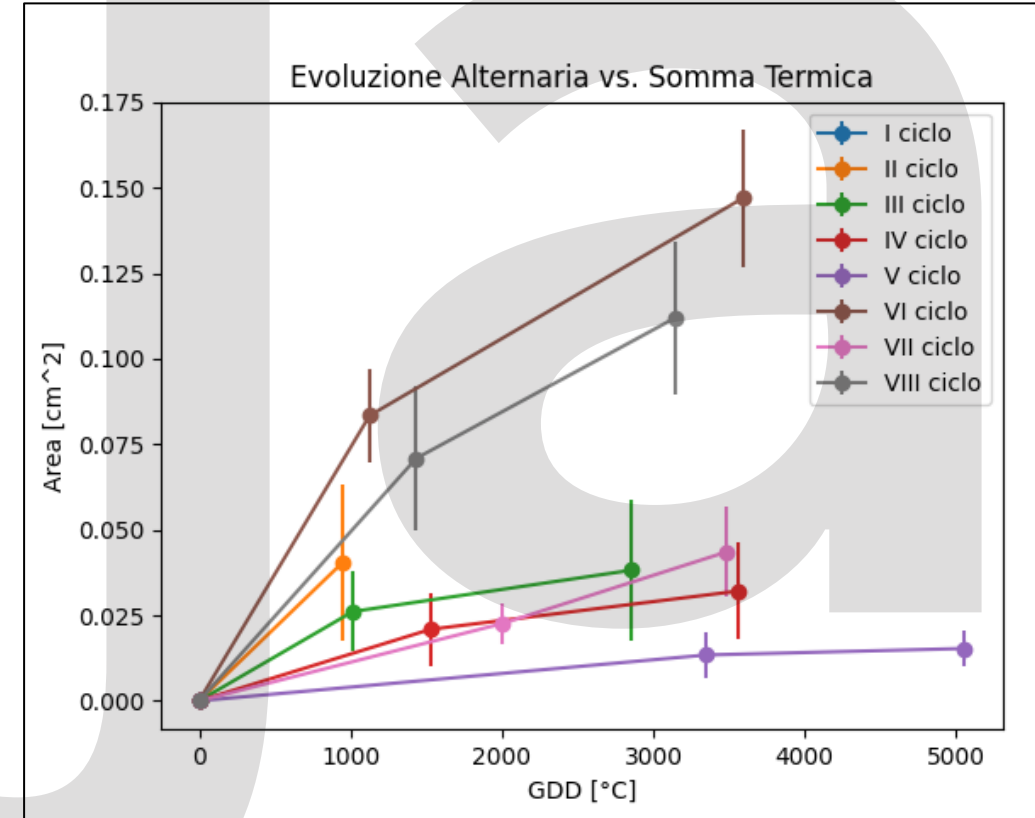


PATHOGEN MODELS DEVELOPMENT PATH

INOCULUM

DISEASE DEVELOPMENT

DISEASE DEVELOPMENT TRAKING

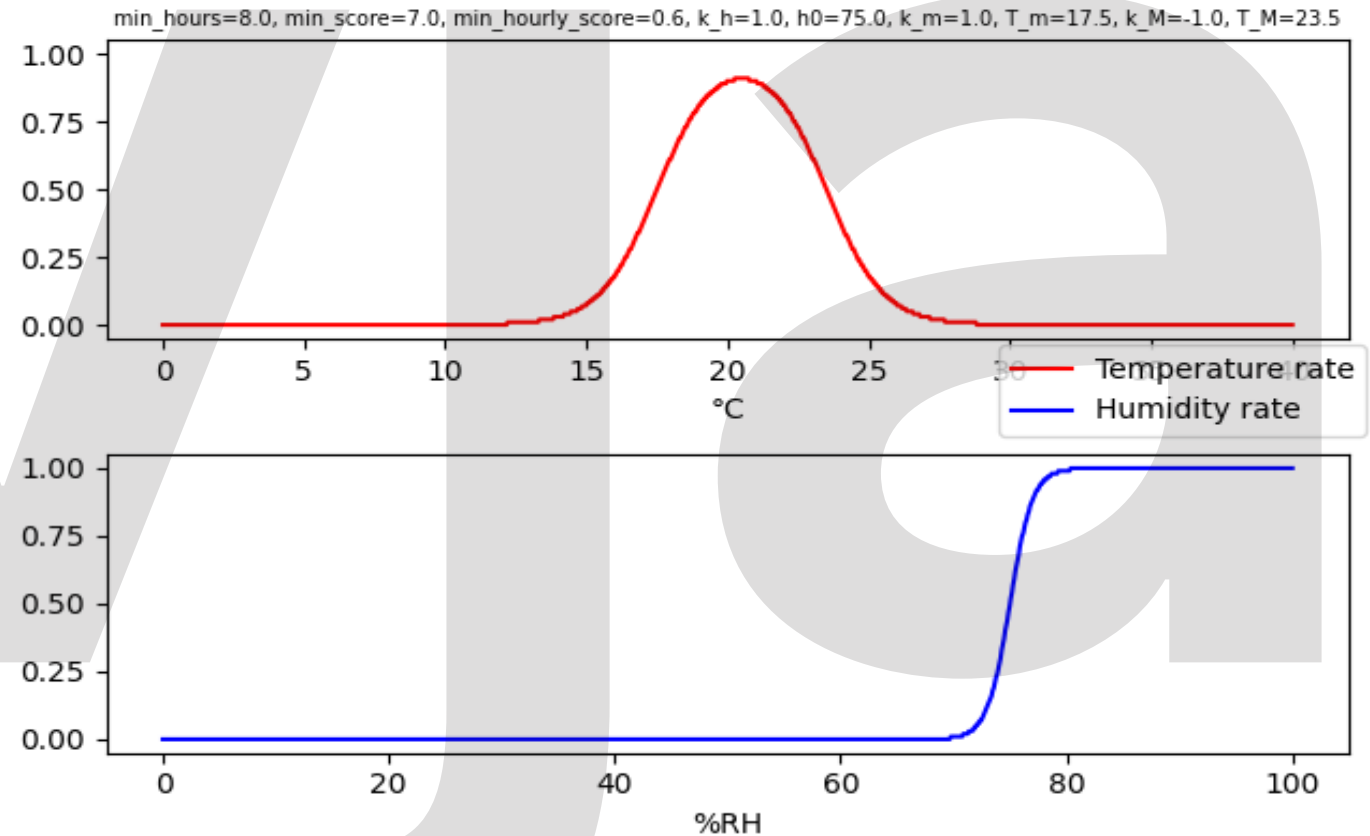


ALTERNARIA PREDICTIVE MODEL

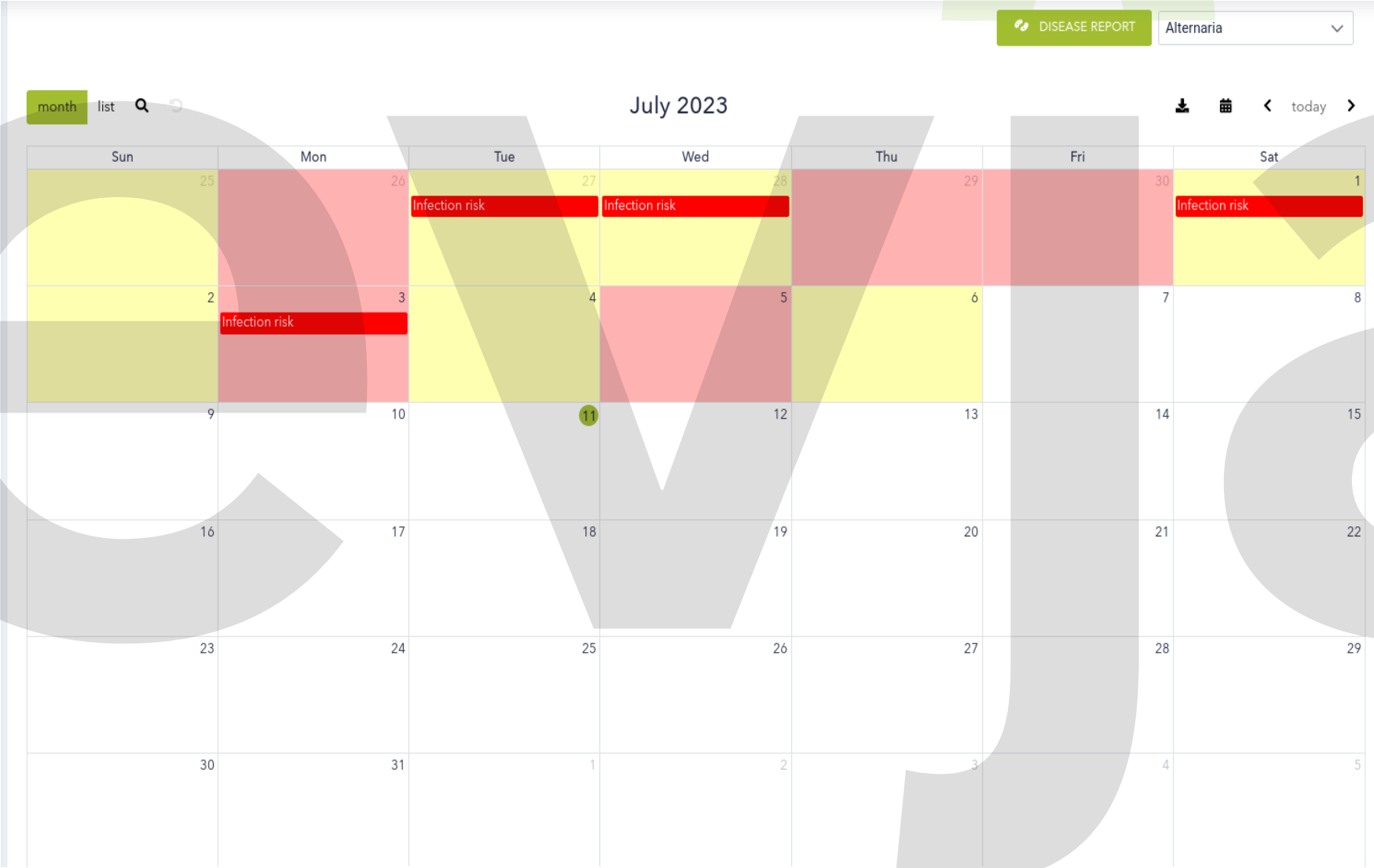
- Hourly infection risk scores based on temperature and humidity
- Dry climate only pauses pathogen development
- Infection is predicted with long enough favourable climate



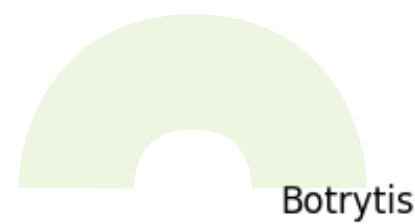
Alternaria



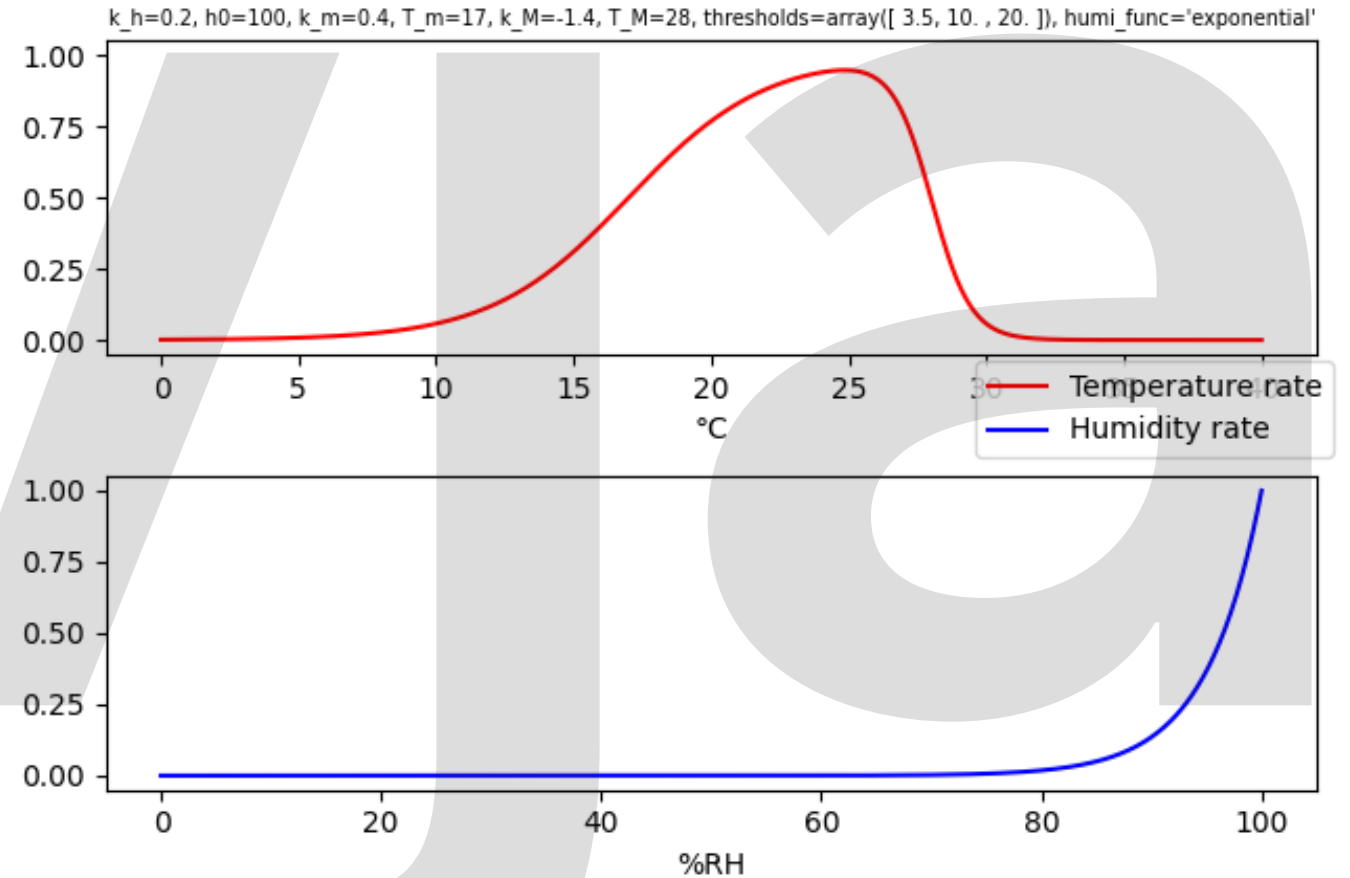
ALTERNARIA PREDICTIVE MODEL



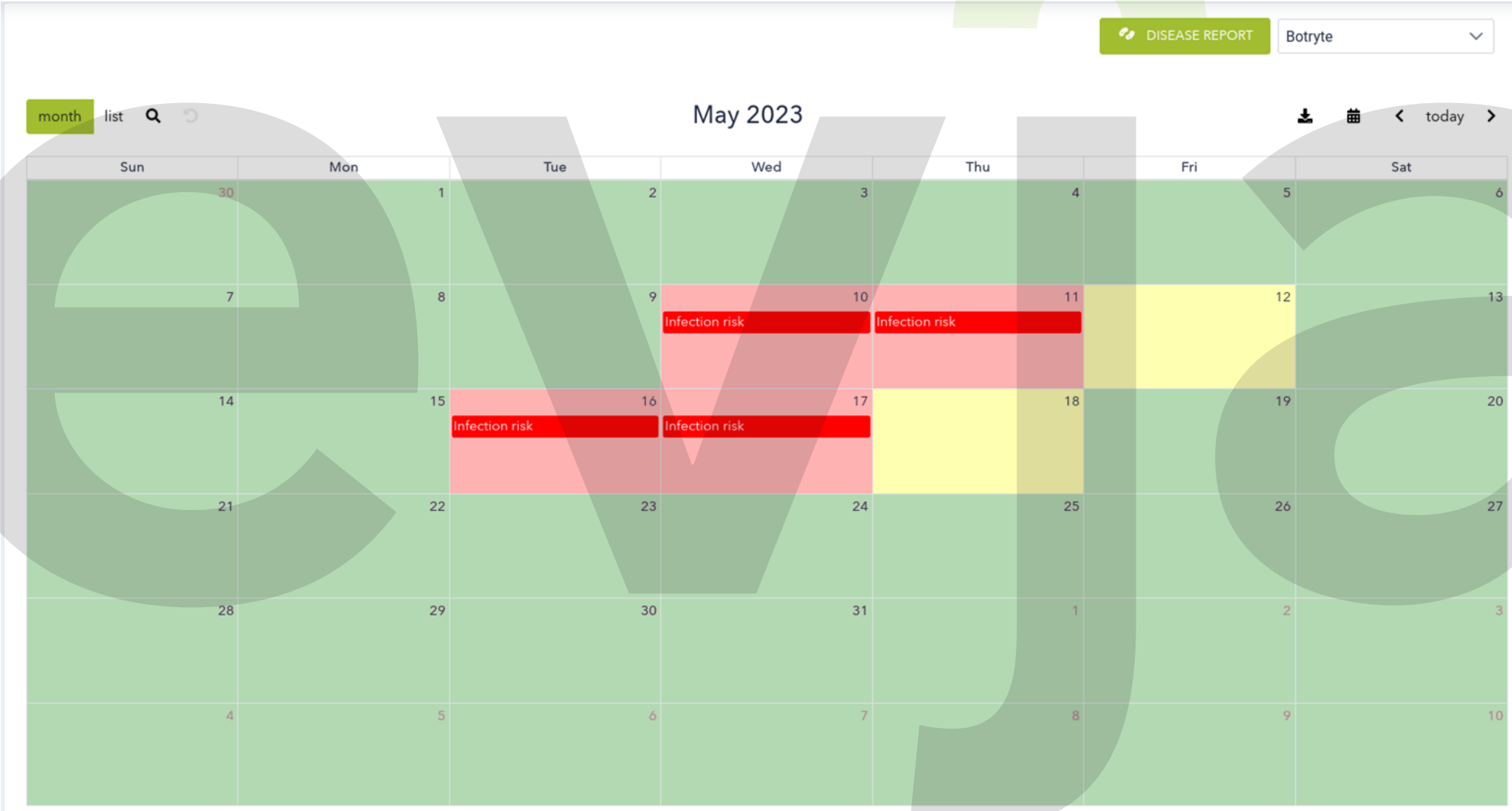
BOTRYTIS PREDICTIVE MODEL



- Hourly infection risk scores based on temperature and humidity
- Dry climate only pauses pathogen development
- Infection is predicted with long enough favourable climate, with 3 damage levels



BOTRYTIS PREDICTIVE MODEL



Greenhouse climate control algorithms

- *Greenhouse cover transmissivity estimation*
- *Whitewash removal/application advice*
- *CO2 depletion alert*
- Condensation alert on:
 - Leaves
 - Fruits
 - Greenhouse cover

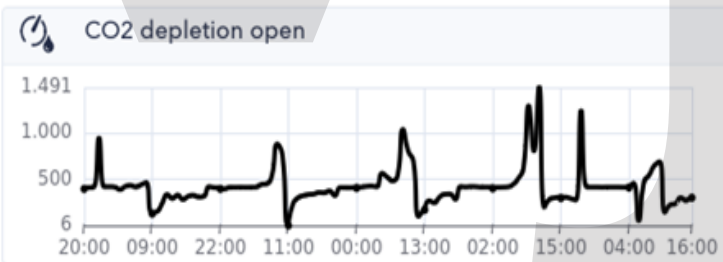
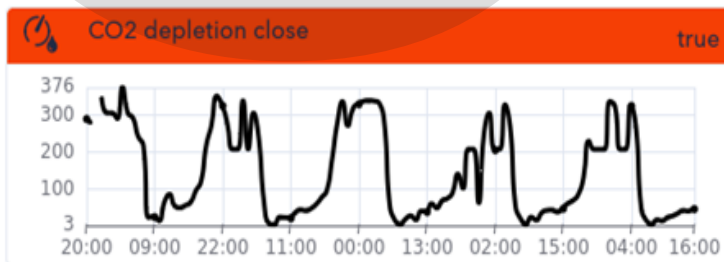
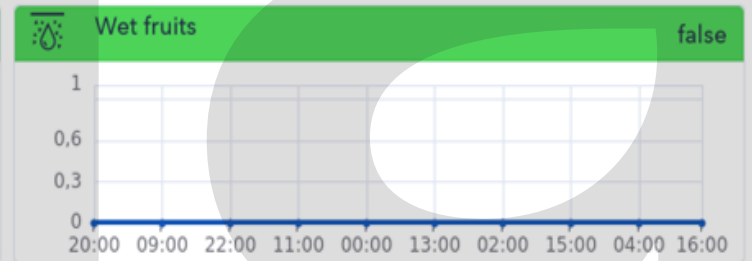
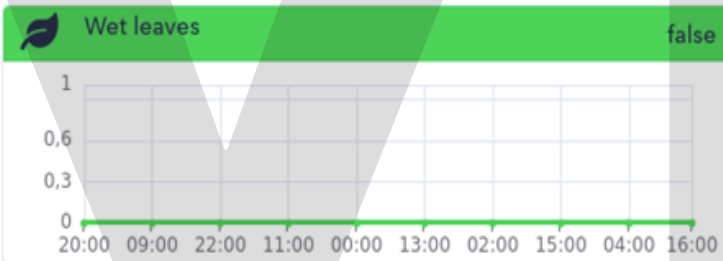
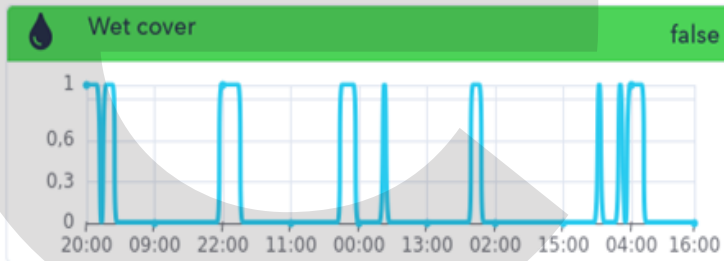
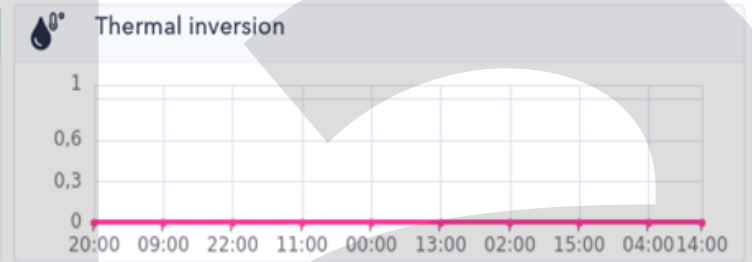
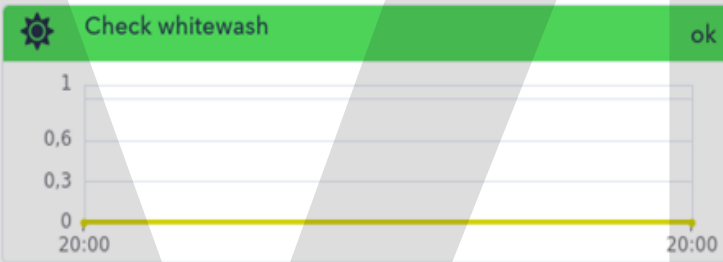
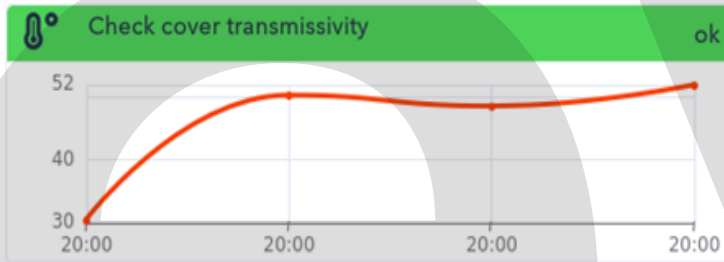
GREENHOUSE CLIMATE CONTROL ALGORITHMS

Greenhouse Checker

2

3

4



Water requirements model estimates:

- **Evapotranspiration** from Temperature and Solar Radiation
- **Crop coefficient** from Growing Degree Days (GDD), plantation density and transplant season
- **Water requirements**, correcting for irrigation water EC and irrigation system

PRHO: WATER REQUIREMENTS

Configuration

Transplant date

30/12/2022

Plant density

2

plants/m²

Irrigation water EC

0.6

dS/m

Irrigation uniformity coefficient

0.95

Save

Irrigation system

Single line

Grouped lines

Dripper flow rate

3

l/h

Distance between drippers

0.5

m

Distance between line groups

1.2

m

Number of lines in a group

2

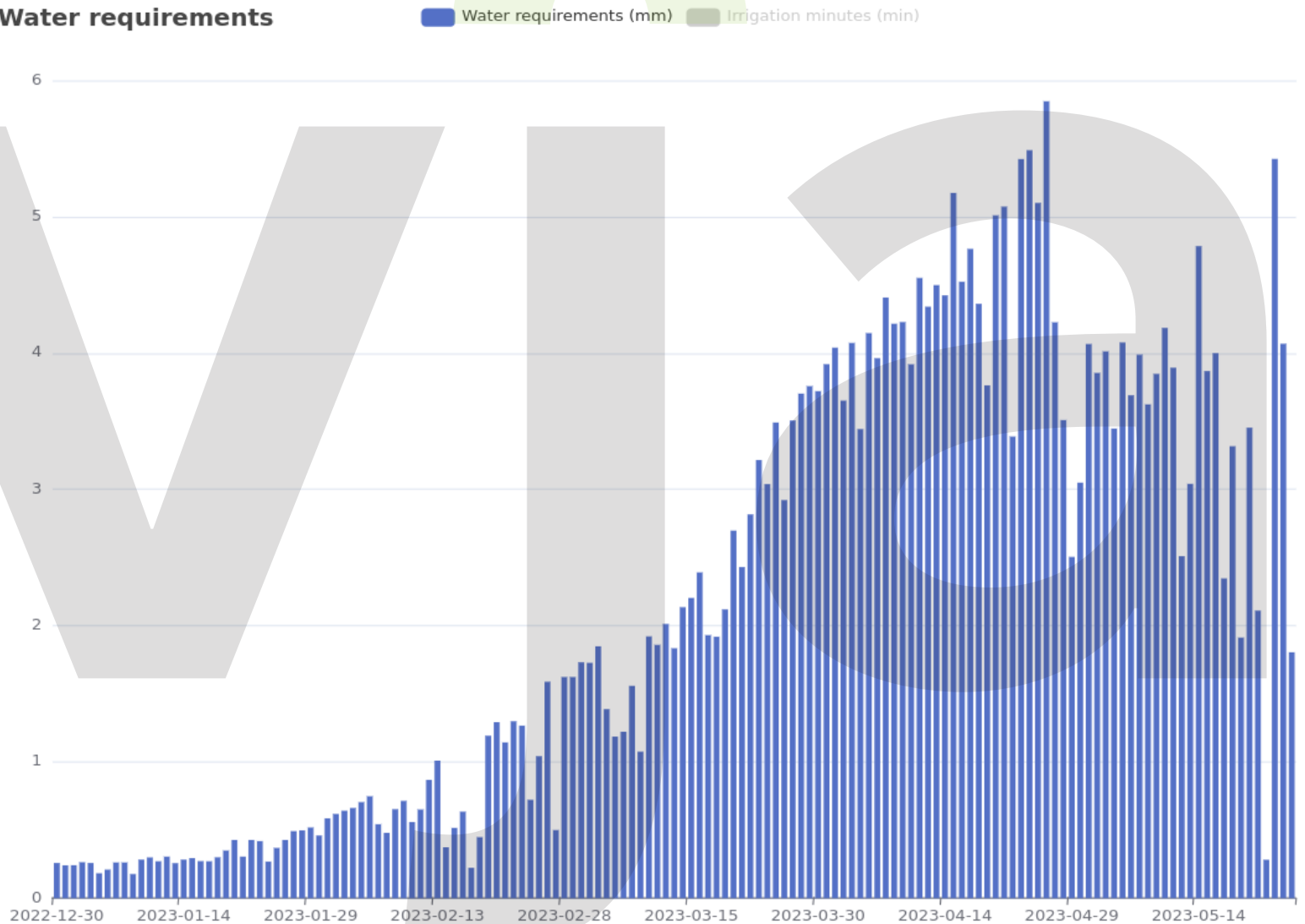
Flow rate density

0.17

l/min m²

Save

Water requirements



PRHO: AGGREGATED RESULTS

Configuration

Transplant date

30/12/2022

Plant density

2

plants/m²

Irrigation water EC

0.6

dS/m

Irrigation uniformity coefficient

0.95

Save

Irrigation system

Single line

Grouped lines

Dripper flow rate

3

l/h

Distance between drippers

0.5

m

Distance between line groups

1.2

m

Number of lines in a group

2

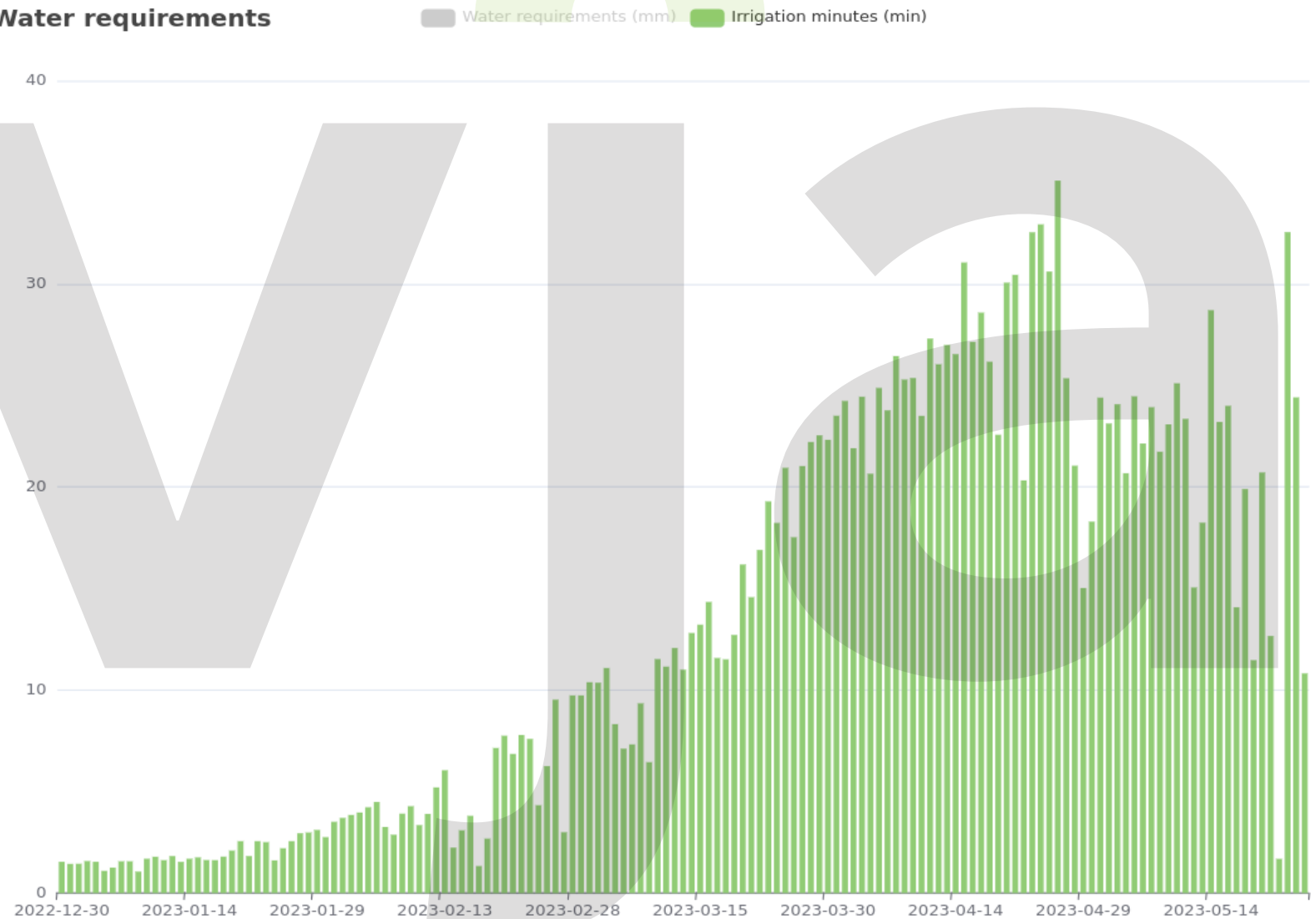
Flow rate density

0.17

l/min m²


Save

Water requirements



PRHO: IRRIGATION MINUTES

Configuration

Transplant date 

Plant density plants/m²

Irrigation water EC dS/m

Irrigation uniformity coefficient

Irrigation system

☐ Single line ☒ Grouped lines

Dripper flow rate l/h

Distance between drippers m

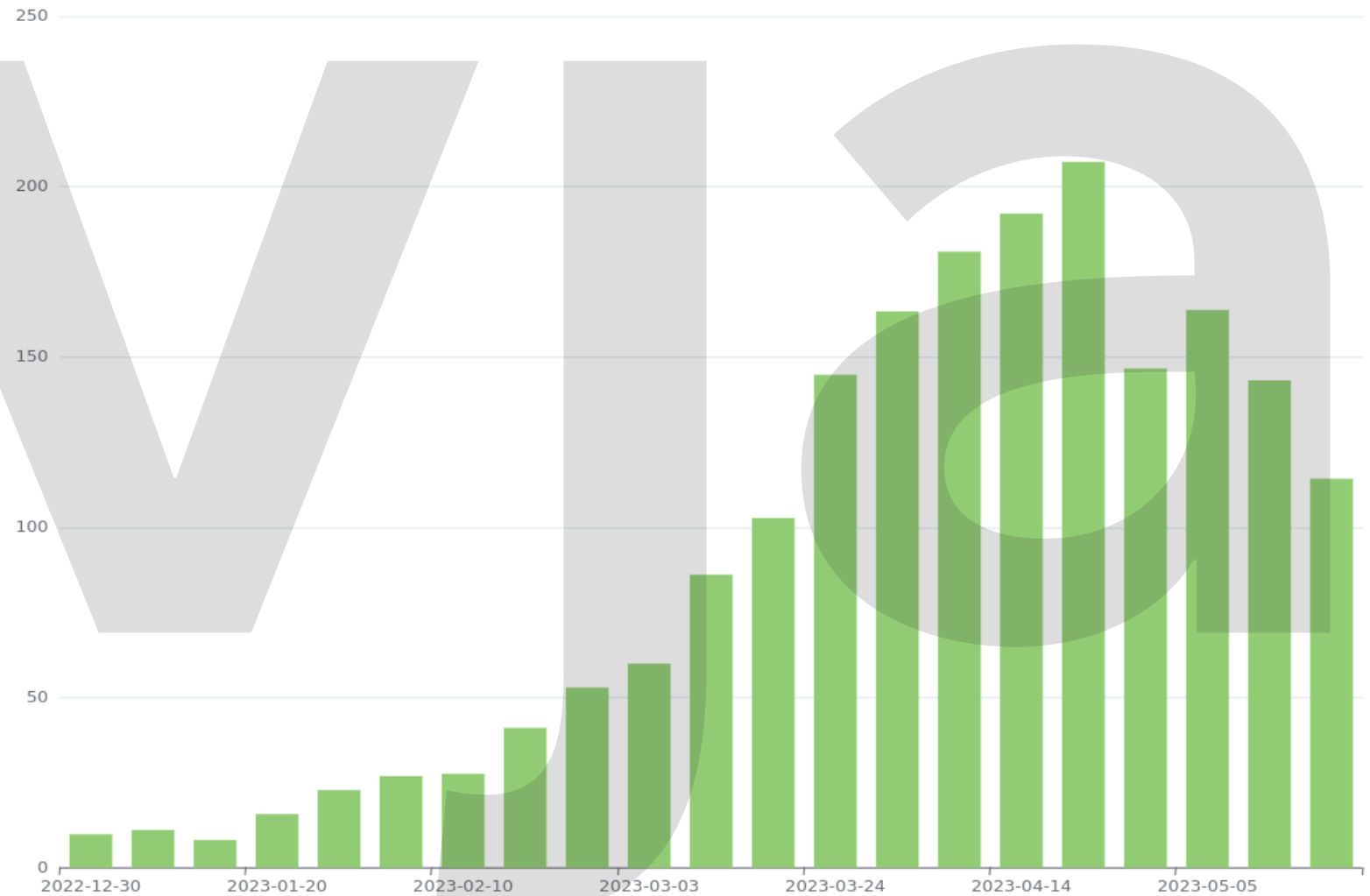
Distance between line groups m

Number of lines in a group

Flow rate density l/min m²

Water requirements [7D]

 Water requirements (mm)  Irrigation minutes (min)



VEGSYST: FERTIGATION IN SOIL

- The VegSyst model simulates **crop dry matter** from growing degree days and absorbed solar radiation
- The model computes **nutrient uptake** from experimentally calibrated dilution curves
- Nitrogen in the soil from **manure fertilization** is also considered
- Using evapotranspiration from $PrHO$, **required nutrient concentrations** are computed
- The requirements are adjusted by soil nutrient content at transplant, to **avoid over/under-fertilization**

VEGSYST: CONFIGURATIONS

Crop

Transplant date

30/12/2022

Expected harvest date

25/05/2023

Root depth

0.3

 m

Save

Soil

Soil density

1.4

 t / m³

Nitrate N content

0

 mg N / kg soil

Organic matter

0.89

 %

Soil composition

Sand

84

 %

Clay

4.72

 %

Silt

11.28

 %

Carbonate content

30.58

 %

Available P - Olsen

94

 mg P / kg soil

Exchangeable K

109

 mg K / kg soil

Exchangeable Ca

2475

 mg Ca / kg soil

Exchangeable Mg

68

 mg Mg / kg soil

Save

Manure

Not usedUsed

Application date

30/12/2022

Volume m³ / ha

Source

Sheep

 Add custom source

Details

Save

Irrigation system

Single lineGrouped lines

Dripper flow rate

3

 l / h

Distance between drippers

0.5

 m

Distance between line groups

1.2

 m

Number of lines in a group

2

Flow rate density

0.17

 l / min m²

Save

Output options

Unit measure of irrigation

☒ mm

☐ minutes

Unit measure of nutrients

☒ mmol / l

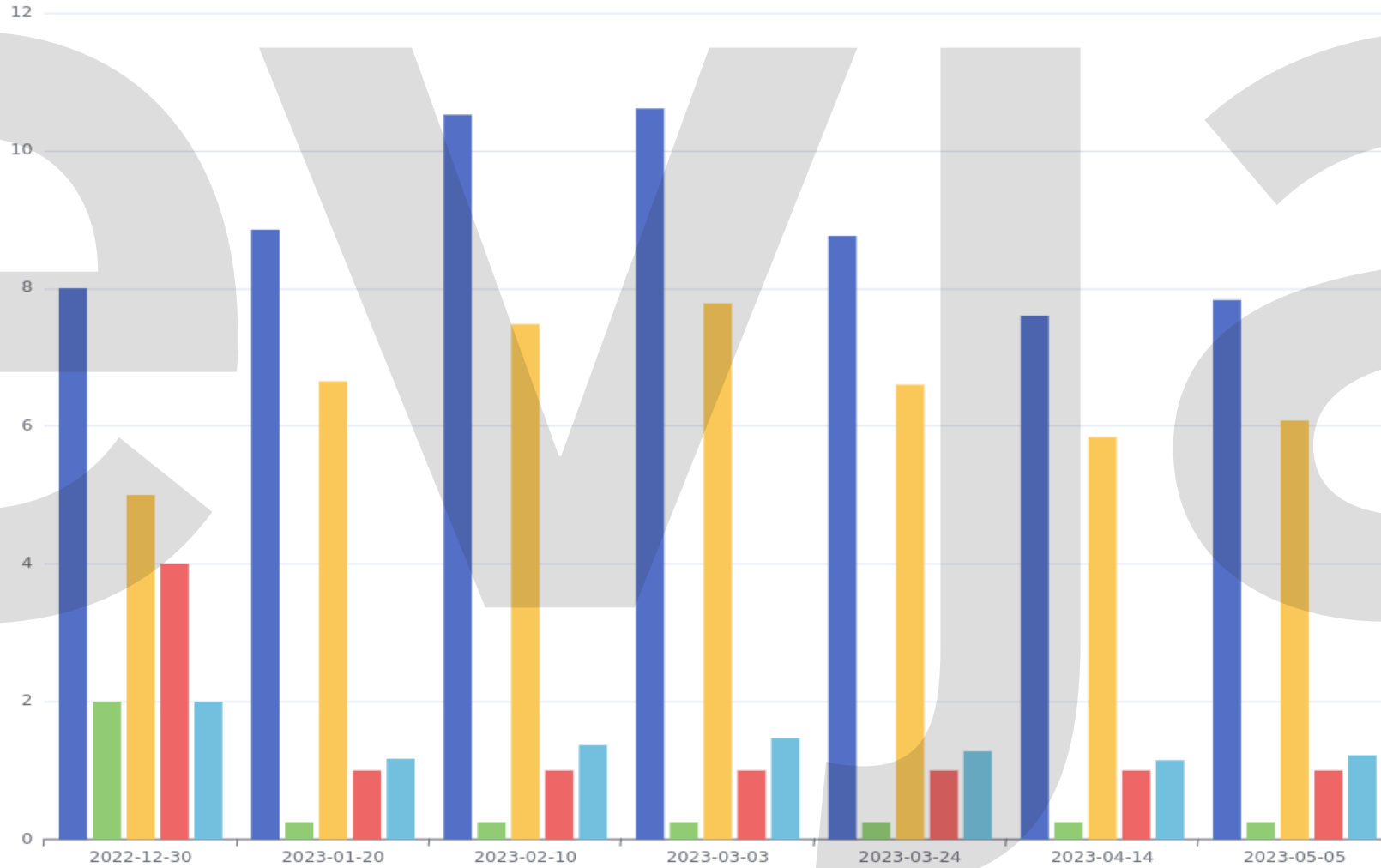
☐ kg / ha

Save

VEGSYST: NUTRIENT CONCENTRATIONS

Concentrations [21D]
[mmol / l]

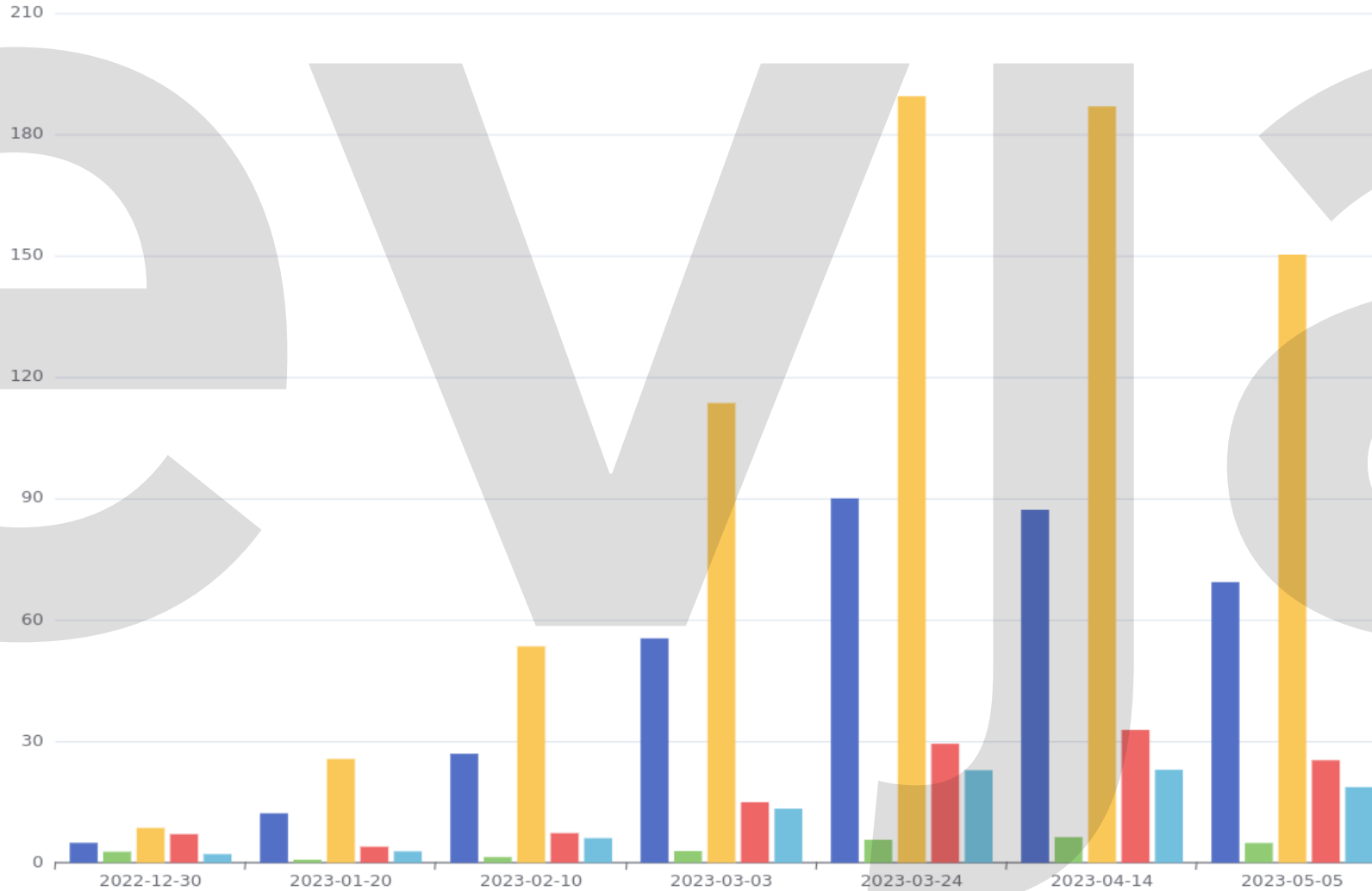
Nitrogen Phosphorus Potassium Calcium Magnesium



VEGSYST: NUTRIENT REQUIREMENTS

**Requirements [21D]
[kg / ha]**

Nitrogen Phosphorus Potassium Calcium Magnesium



- Tracks the nutrient solution that goes in the **crop uptake**, the **substrate** and the **drainage tank**
- Simulates in every compartment the nutrient concentrations and EC, that grow due to **ballast ions**
- Applies to both **open systems** (drainage runs off) and **semi-closed systems** (drainage goes back to the main tank)
- Gives advice about **water use** and **flushing**, considering drainage regulations

SIMULHYDRO: CONFIGURATIONS

Crop

Transplant date

19/05/2023

Expected harvest date

16/10/2023

Number of cultivation stages

2

Tomato type

Round

Save

Growing setup

Fertigation cycle

Open

Semi-closed

Volume of the mixing tank

8

L/m²

Volume of the water in the substrate

5

L/m²

Cultivation area

2000

m²

Save

Crop cultivation stages

Stage start

19/05/2023

Stage end

31/07/2023

Leaching fraction

0.3

Water mixing efficiency

0.8

Nutrients

Macronutrient concentrations
(mmol/L)

	HCO ₃ ⁻	NO ₃ ⁻	NH ₄ ⁺	PO ₄ ³⁻	K ⁺	Ca ²⁺	Mg ²⁺	Na ⁺	SO ₄ ²⁻	Cl ⁻
Irrigation water	3.7	0.0	0.0	0.0	0.0	1.5	0.8	9.5	0.6	9.2
Acidified irrigation water	0.6	10.0	0.0	1.0	6.7	4.0	0.8	9.5	2.5	9.2
Flushing solution	0.0	10.0	0.0	1.0	6.7	4.0	0.8	9.5	2.5	9.2
Reference nutrient solution	0.0	10.0	0.0	1.0	6.7	4.0	0.8	9.5	2.5	9.2
Crop uptake	0.0	10.0	0.0	1.0	6.7	3.55	0.6	0.18	1.5	0.18

Micronutrient concentrations
(umol/L)

	Fe ²⁺	B ⁺	Cu ²⁺	Zn ²⁺	Mn ²⁺	Mo ²⁺
Irrigation water	1.3	10	0.2	1.1	0.0	0.0
Acidified irrigation water	1.3	10	0.2	1.1	0.0	0.0
Flushing solution	1.3	10	0.2	1.1	0.0	0.0
Reference nutrient solution	15	25	1	5	10	1
Crop uptake	7	10	1	2	2	0.5

EC (dS/m)

Irrigation water	1.53
Acidified irrigation water	1.53
Flushing solution	1.53
Reference nutrient solution	2.7

Save

Neutrality test

✓

✓

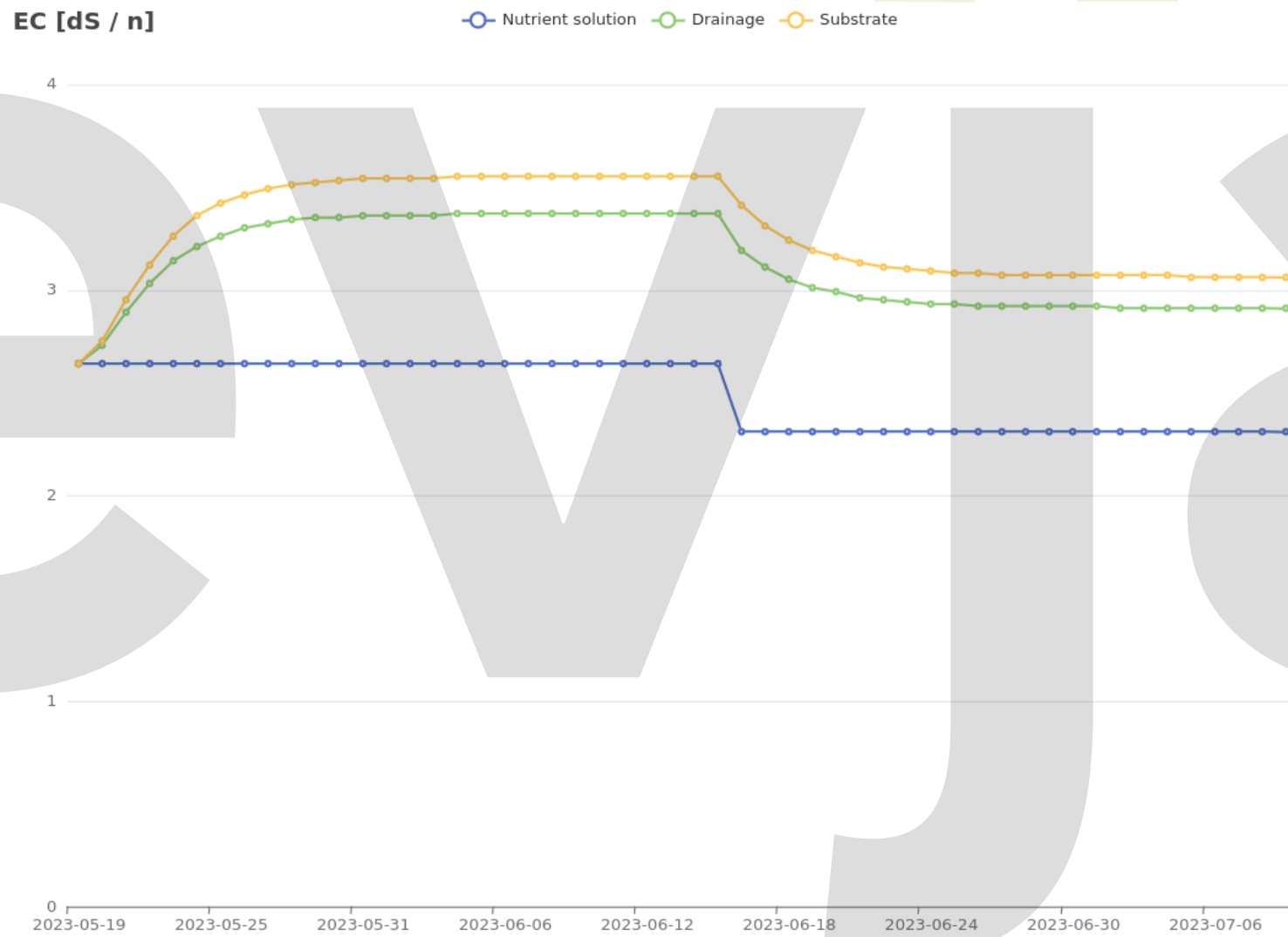
✓

✓

Check

< Stage I > Save Add stage

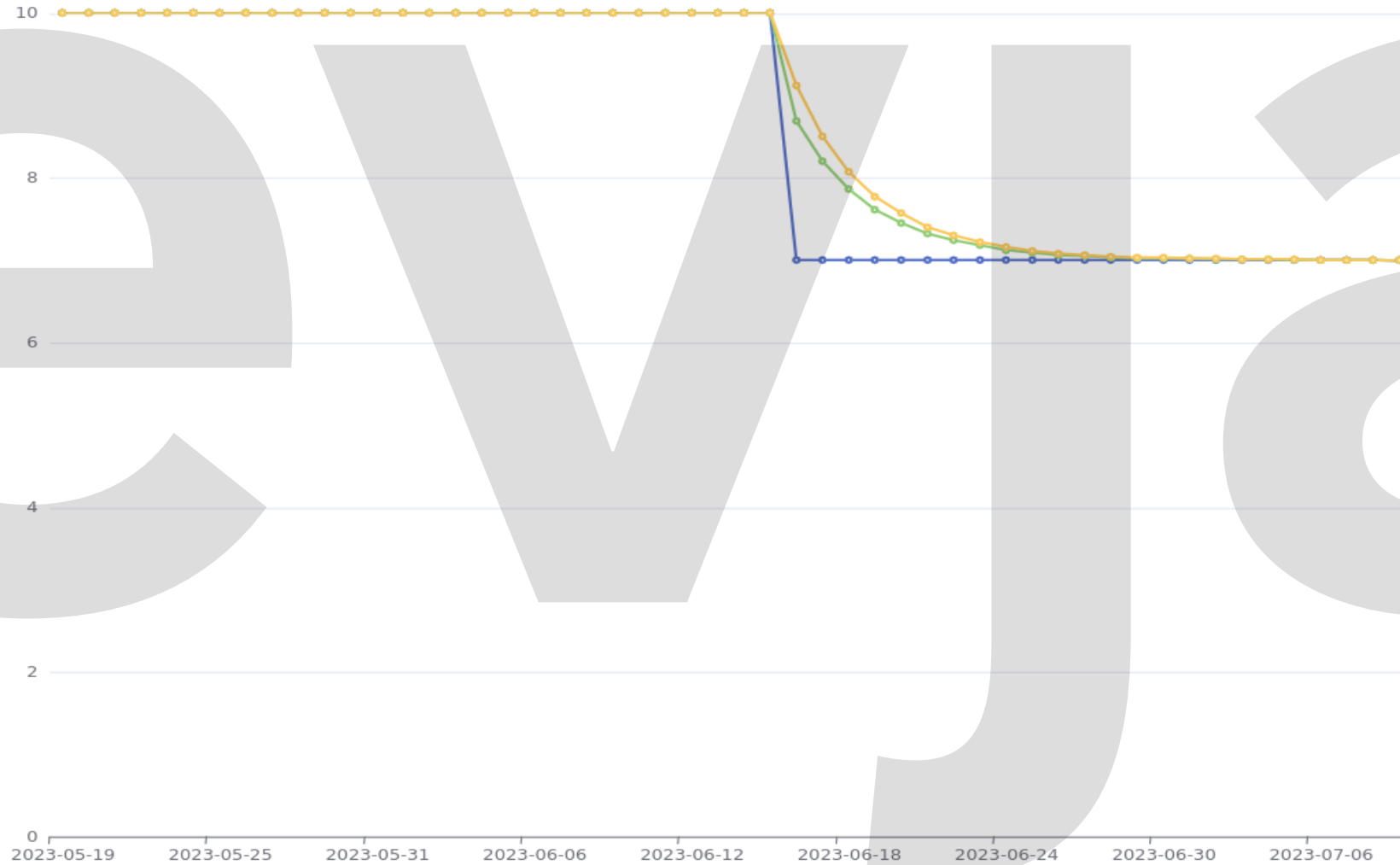
SIMULHYDRO: SOME RESULTS



SIMULHYDRO: SOME RESULTS

NO₃ [mmol/L]

—○— Nutrient solution —○— Drainage —○— Substrate



SIMULHYDRO: SEMI-CLOSED CONFIGURATION

Crop

Transplant date

Expected harvest date

Number of cultivation stages

Tomato type

Save

Growing setup

Fertigation cycle ☐ Open ☒ Semi-closed

Strategy ☐ A ☒ B ☐ C

Volume of the mixing tank L/m²

Volume of the water in the substrate L/m²

Volume of water used for flushing the substrate L/m²

Cultivation area m²

Maximum discharge concentrations

Decreto 152/2006

Macronutrient (mmol/L)

HCO₃⁻ NO₃⁻ NH₄⁺ PO₄³⁻ K⁺ Ca²⁺ Mg²⁺ Na⁺ SO₄²⁻ Cl⁻

Micronutrient (umol/L)

Fe²⁺ B⁺ Cu²⁺ Zn²⁺ Mn²⁺ Mo²⁺

Add environmental law

Save

Crop cultivation stages

Stage start

Stage end

Leaching fraction

Water mixing efficiency

Fertigation strategy A

Maximum value of EC before flushing dS/m

Daily recovered drainage for continuous bleeding %

Drainage discharge in the environment %

Save

Nutrients

Macronutrient concentrations (mmol/L)

Concentrations

	HCO ₃ ⁻	NO ₃ ⁻	NH ₄ ⁺	PO ₄ ³⁻	K ⁺	Ca ²⁺	Mg ²⁺	Na ⁺	SO ₄ ²⁻	Cl ⁻
Irrigation water	3.7	0.0	0.0	0.0	0.0	1.5	0.8	9.5	0.6	9.2
Acidified irrigation water	0.6	10.0	0.0	1.0	6.7	4.0	0.8	9.5	2.5	9.2
Flushing solution	0.0	10.0	0.0	1.0	6.7	4.0	0.8	9.5	2.5	9.2
Reference nutrient solution	0.0	10.0	0.0	1.0	6.7	4.0	0.8	9.5	2.5	9.2
Crop uptake	0.0	10.0	0.0	1.0	6.7	3.55	0.6	0.18	1.5	0.18

Micronutrient concentrations (umol/L)

Concentrations

	Fe ²⁺	B ⁺	Cu ²⁺	Zn ²⁺	Mn ²⁺	Mo ²⁺
Irrigation water	1.3	10	0.2	1.1	0.0	0.0
Acidified irrigation water	1.3	10	0.2	1.1	0.0	0.0
Flushing solution	1.3	10	0.2	1.1	0.0	0.0
Reference nutrient solution	15	25	1	5	10	1
Crop uptake	7	10	1	2	2	0.5

EC (dS/m)

Neutrality test

Save

Check

< Stage 1 >

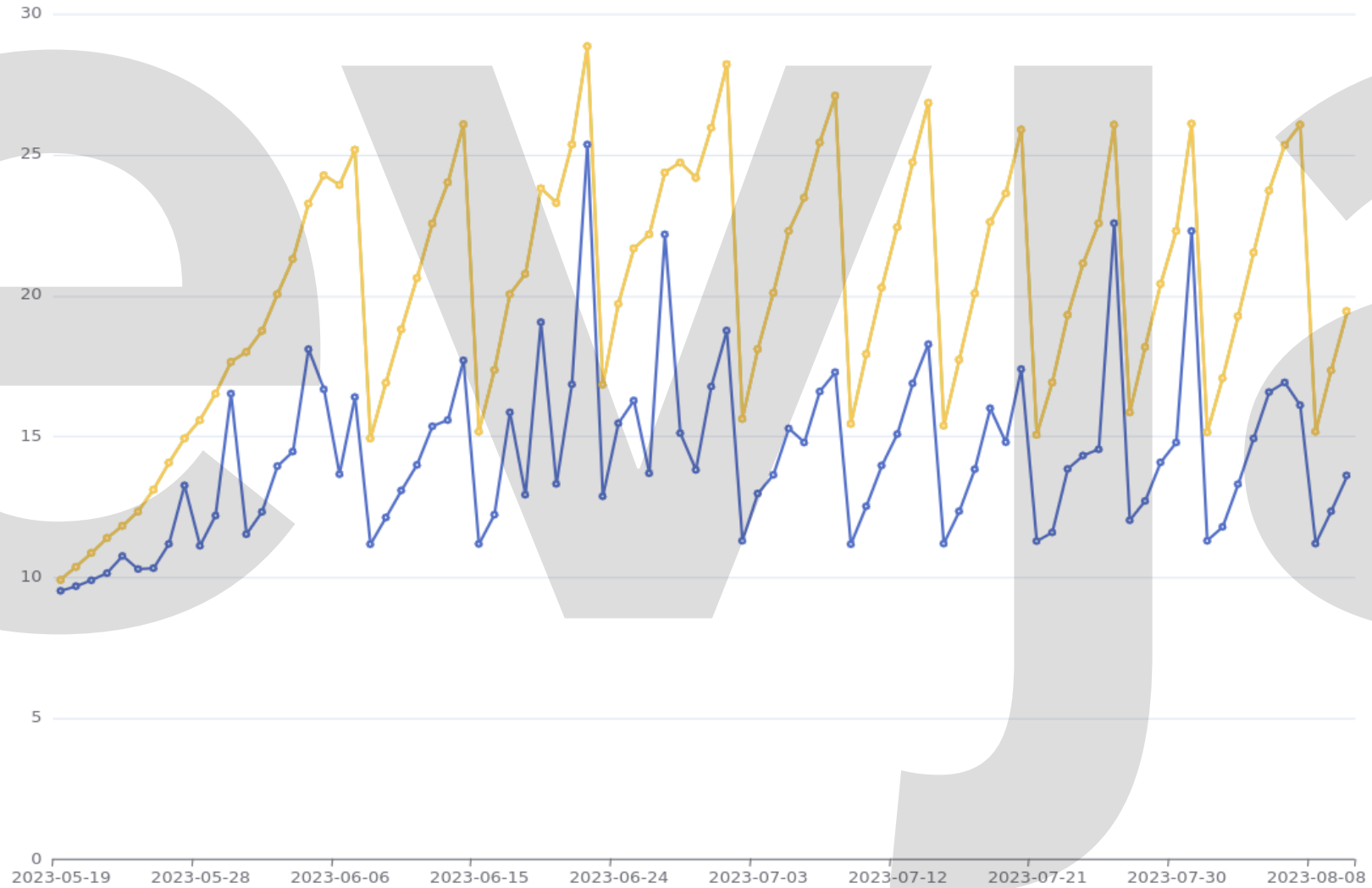
Save

Add stage

SIMULHYDRO: SEMI-CLOSED RESULTS

Closed Na [mmol/L]

—○— Nutrient solution —○— Drainage —○— Substrate





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