



Presentation



Our commitments

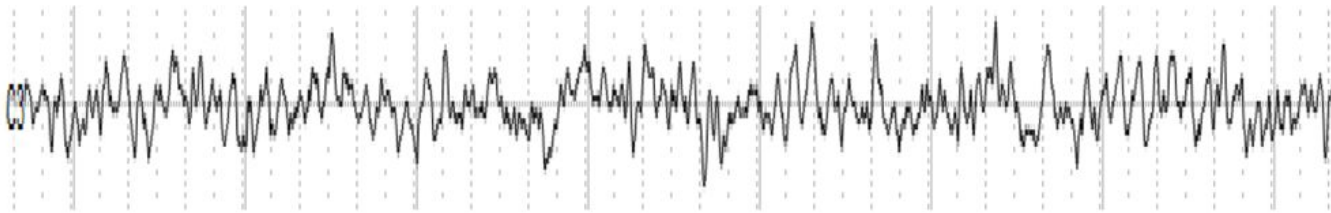
We are committed to connecting humans and plants, and to participate in the resilience of agriculture, by providing useful information to winegrowers on the state of their vines.

Listen to your crops !

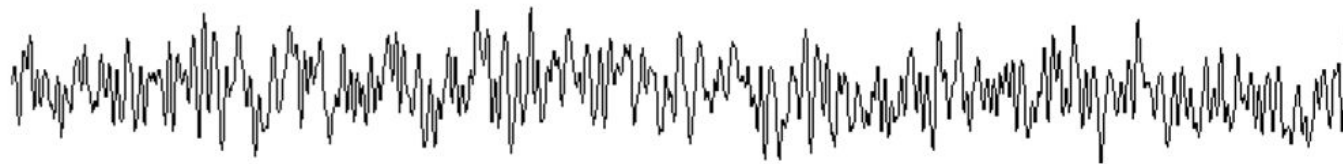


At the origins of **Vegetal** Signals, Neuroscience

HUMAIN



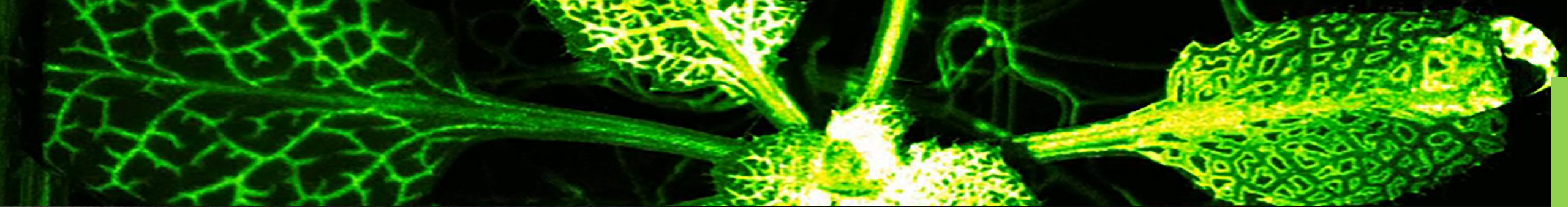
8 sec



VEGETAL



Our technology interprets biological signals into the plant to inform vine growers in real time and continuously on the state of their vineyards and develop innovative and efficient technical itineraries



Plant electrophysiology at the heart of our technology

Determining the precise needs of a plant and supporting it as best as possible during its cycle and while respecting its terroir and its environment is a major challenge for the wine industry.

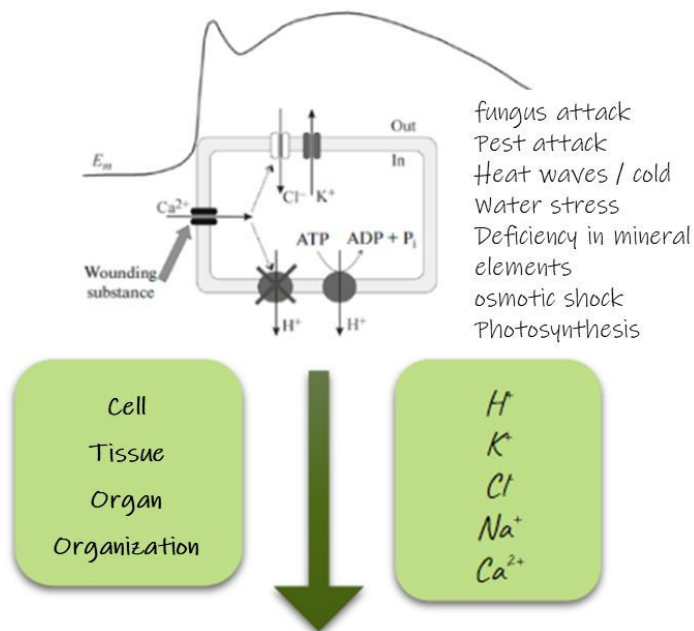
Who better than the plant can testify to its condition ?

Plant electrophysiology is a recent science. At the heart of the Phloem, at the level of membrane proteins, there is an electrical activity allowing the transport of essential molecules and the signaling of environmental stresses of biotic origin (aggressions by pathogens) or abiotic (excess or defect of light, sudden fluctuations in temperature, hypoxia, water stress, salinity, etc.).

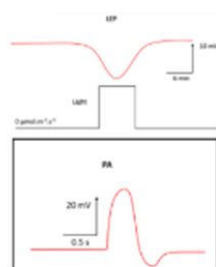
In 2022, after 5 years of R&D, the Vegetal Signals team managed to capture, process and interpret these electrical signals to provide useful information to farmers on the physiological state of vines in real time.



Technology principle

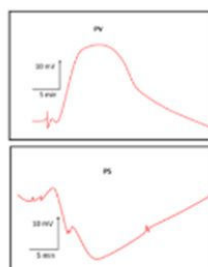


Electrical potentials



Local electrical potential

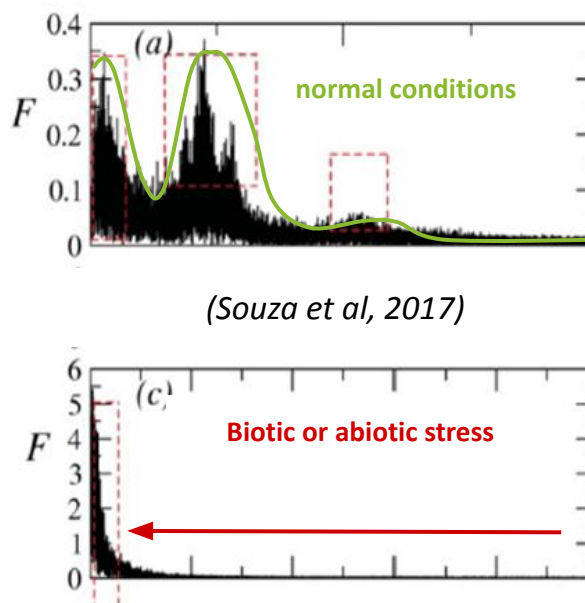
electrical potential



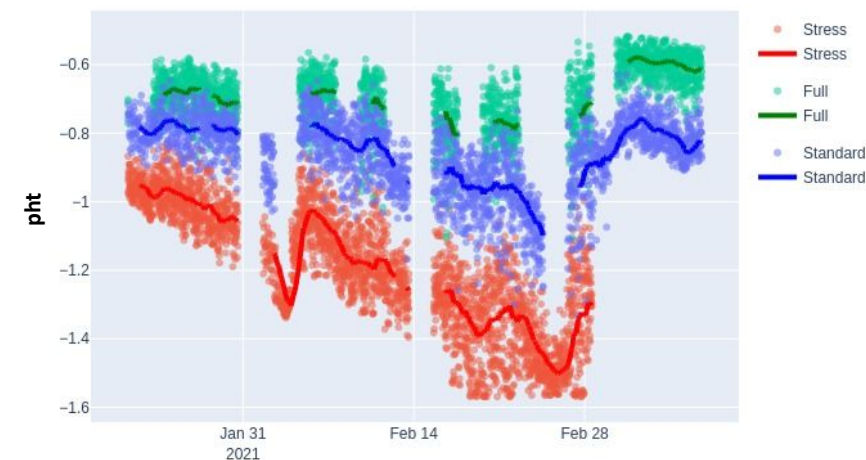
Variation potential

System potential

What distribution of electrical activity by frequency?



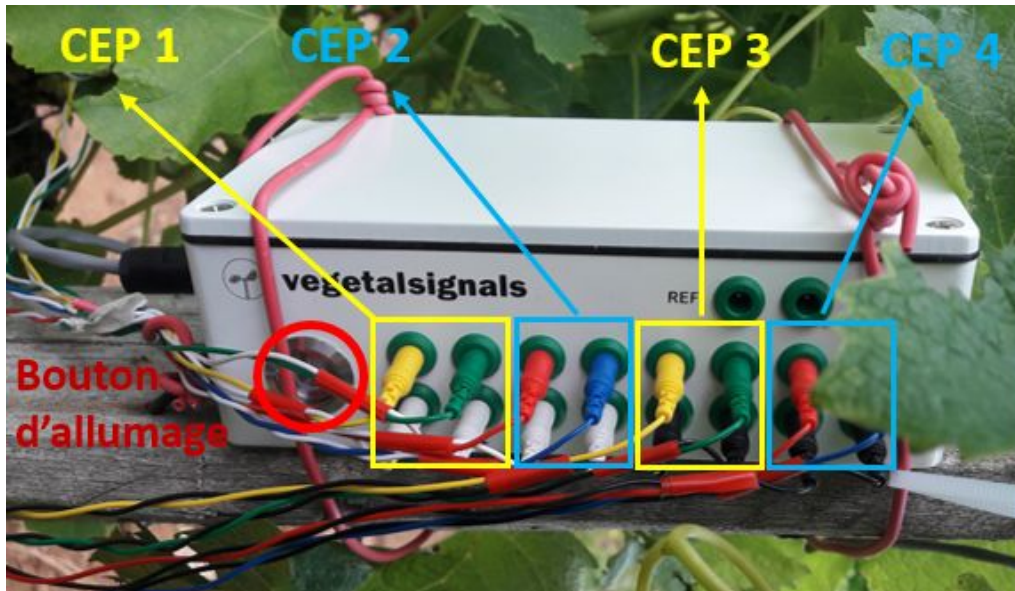
Example: Differentiation of vine irrigation modalities from signals in Stellenbosch - 2021



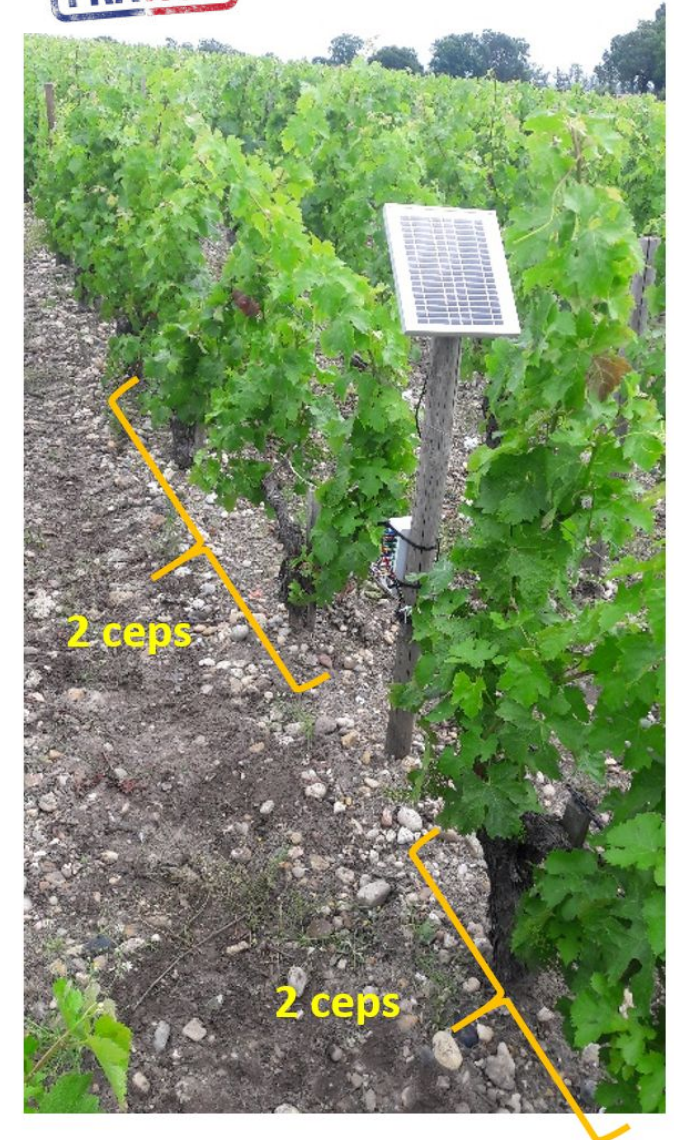
A kit ready to install in the vineyard

- 1 sensor made up of 8 pairs of electrodes
- Position of electrodes: primary branches
- Power supply: solar panel
- Data recording: micro SD card
- Data sent every 10 minutes via cellular network

20 minutes to install
Each sensor and 5
minutes to uninstall

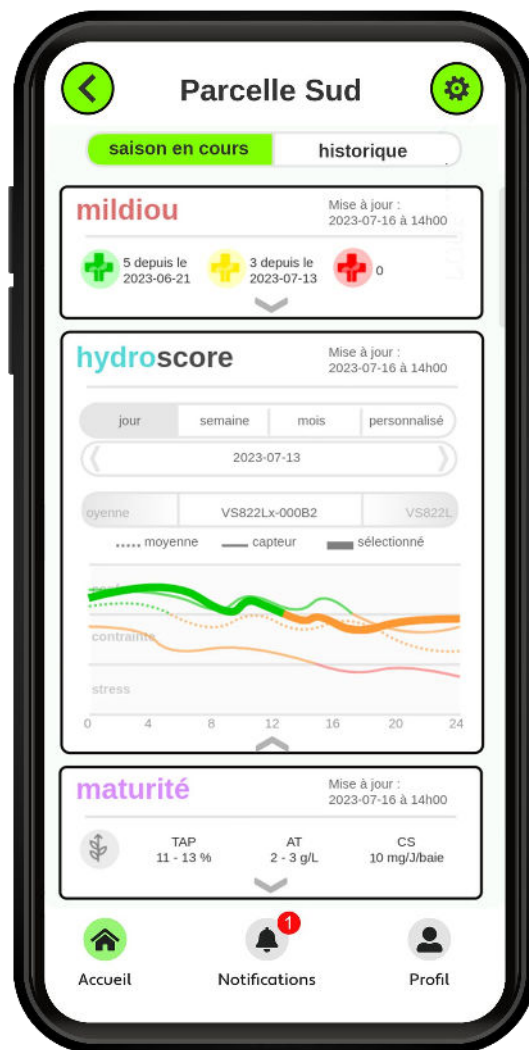


Listen to you crops !



4 services for vine growers in 1 sensor

Listen to you crops !



- **hydroscore**

Real-time monitoring of the water status of your vines

- **Diseases Presymptomatic Detection mildiou**

BETA TESTING

Beta test since 2022

- **maturity monitoring**

BETA TESTING

Beta test from 2023

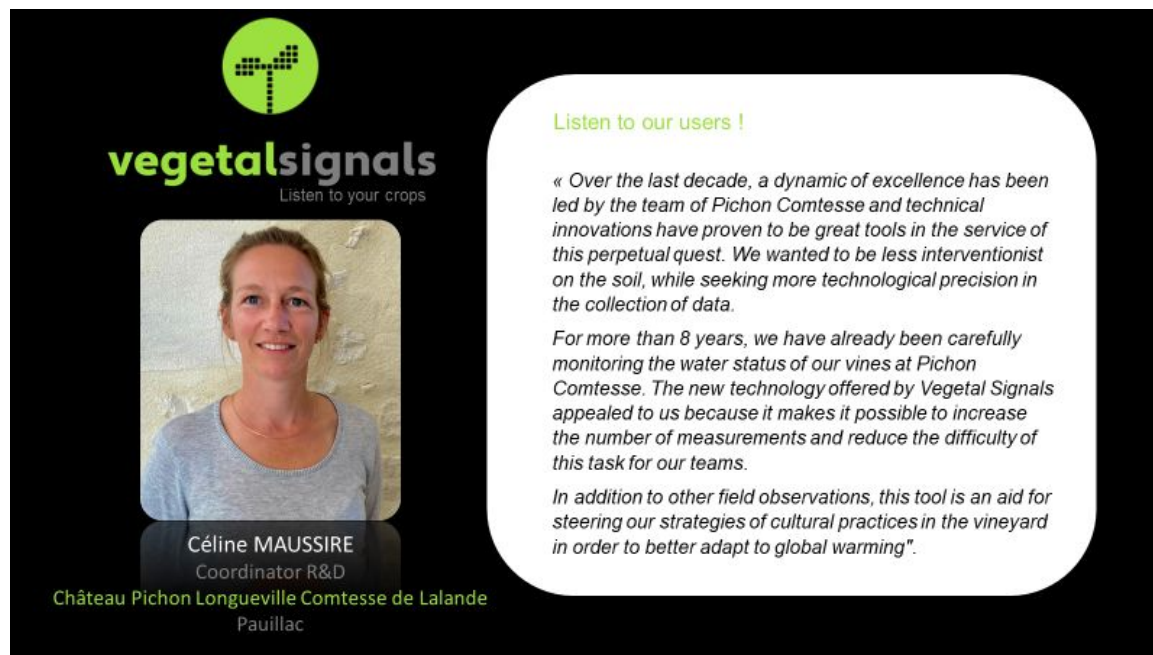
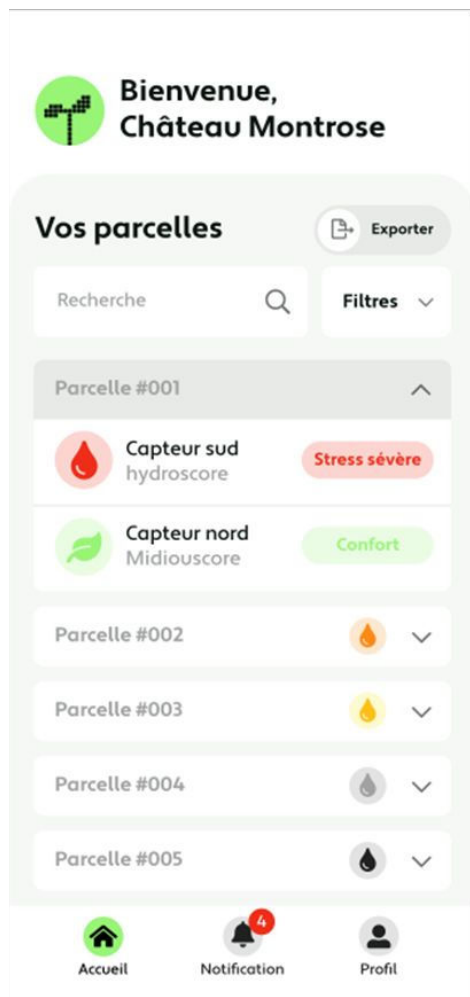
Indicators : Evolution of the degree of potential alcohol, total acidity and sugar loading.

- **Premium service**

Tailor-made model trained on your vineyard

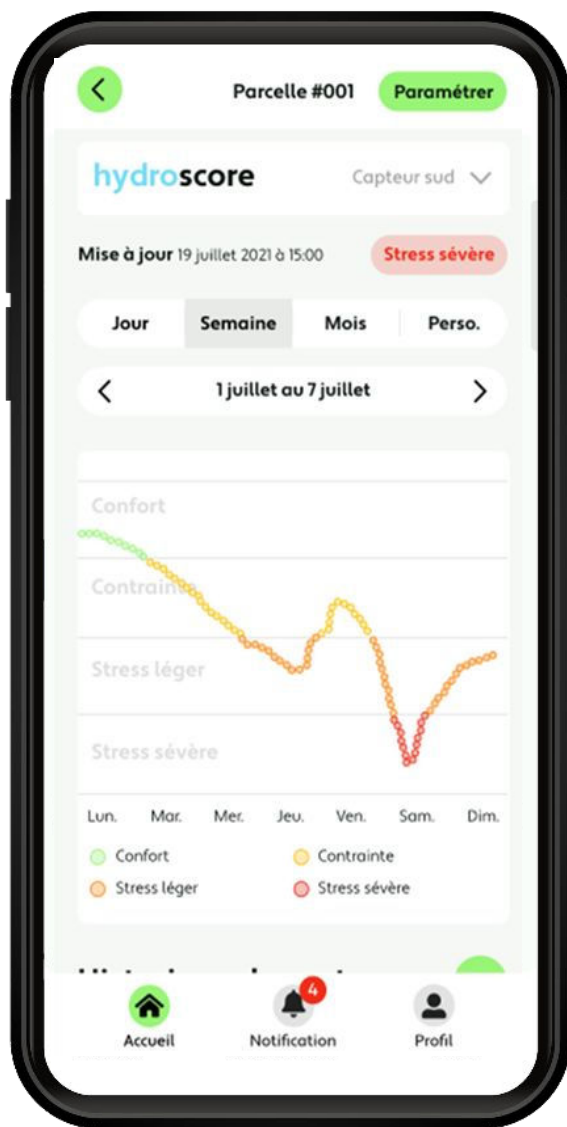


hydroscore



Calibrated with stem water potential measurements

*110 plots on
3 vintages: 2020 to 2022*



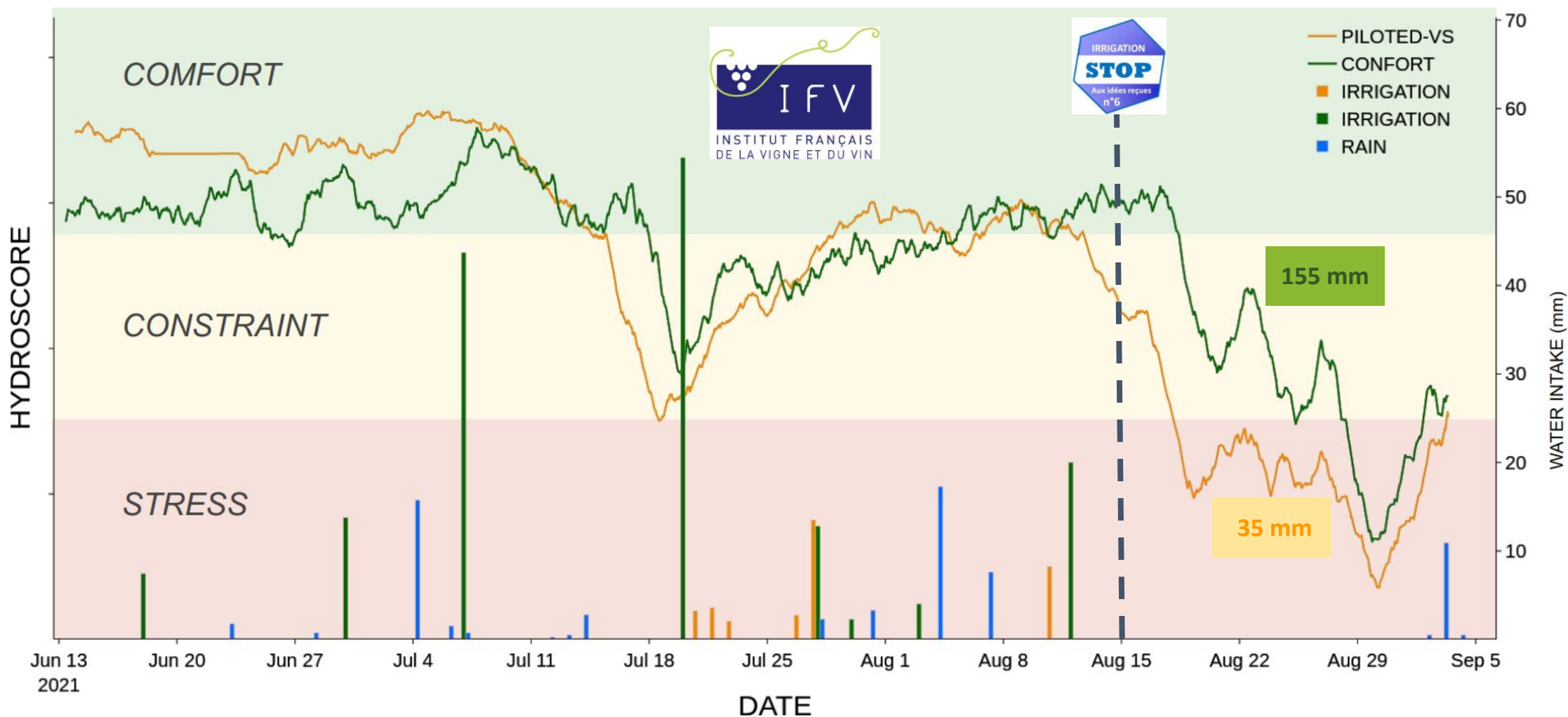
What's the point ?

- Real-time monitoring of the water status of the vine
- smartphone app
- History of your data
- In-app note taking

Uses cases ?

- Optimization of your irrigation according to the real needs of your vines
- Significant water savings
- Positioning of biostimulant products
- Comparison of plots
- Comparison of technical itineraries
- Monitoring of a young planted plot for which excessive water stress can be fatal or conversely too much water comfort high may affect its future resilience.

Merlot Plot in Marguerittes / Nîmes - South of France - Vintage 2021



Mildew Presymptomatic Detection

Listen to you crops !

BETA TESTING



*Calibrated with health monitoring
observations in the vineyard*

50 plots on 2 vintages : 2021 & 2022

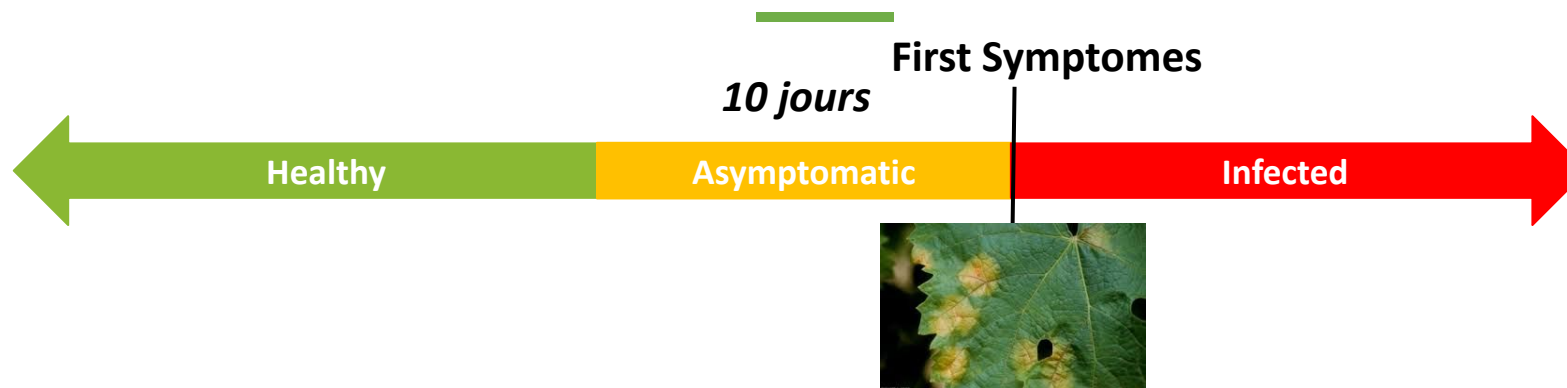


What's the point ?

- Detect in real time a late blight infection before the appearance of the first visible symptoms (D-5)
- 4 feet monitored by sensor
- Smartphone app
- Alert system
- In-app note-taking

To do what ?

- Suivre la pression maladie sur un réseau de parcelles de référence (TNT ou autres)
- Réduction des premiers traitements
- Adaptation des traitements phytosanitaires en fonction de la pression



Preventive treatments, but possibilities of

Pre-symptomatic strategy



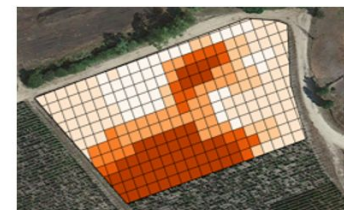
- Notice the infection before symptoms
- Spray infected zones with curative products



Attack frequency strategy



- Monitor the disease frequency index in real time
- Adapt the concentration of the spraying product



Model accuracy

86%

Average

- 5 d

BETA TESTING

Evolution of attack probability during the season

KEY

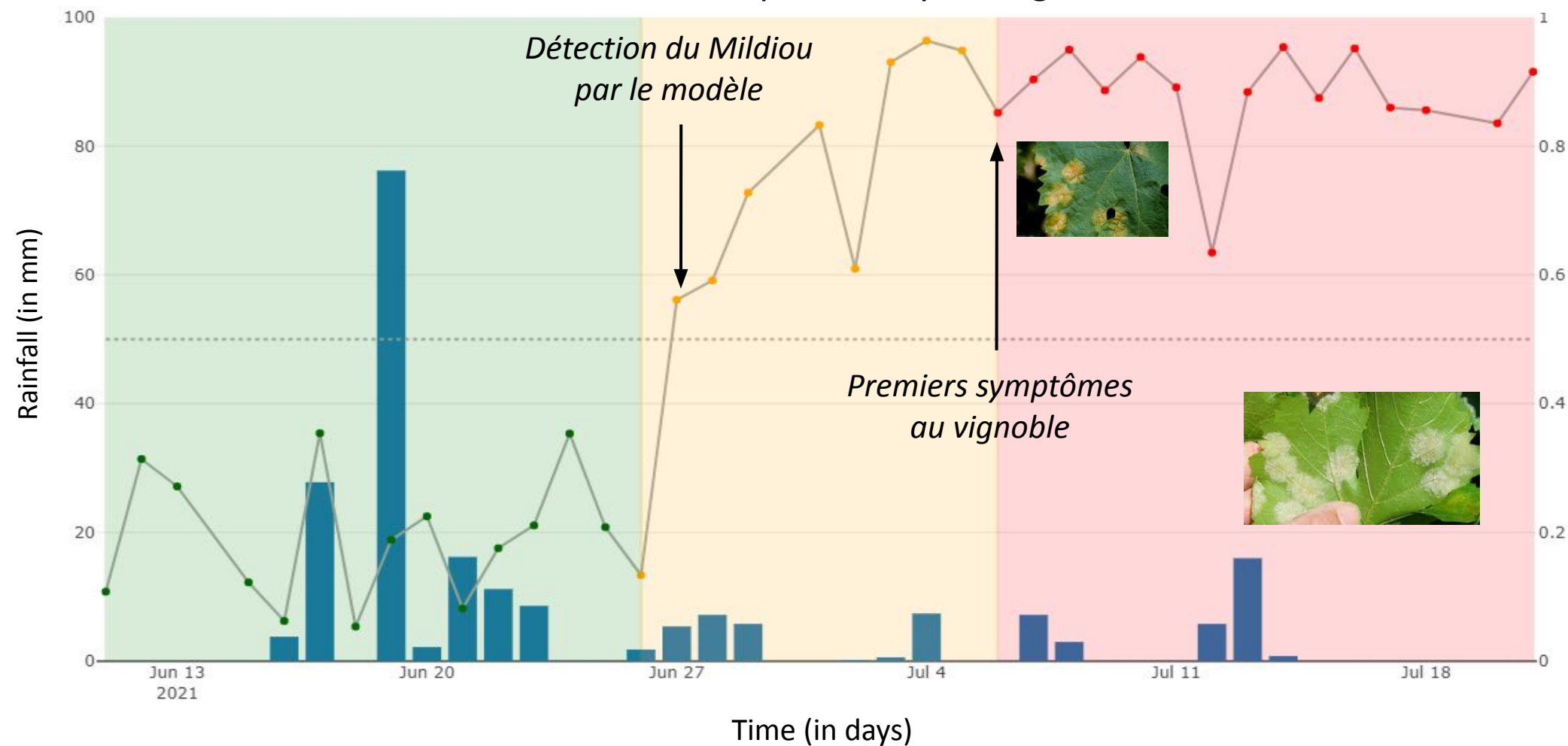
Rainfall

Healthy

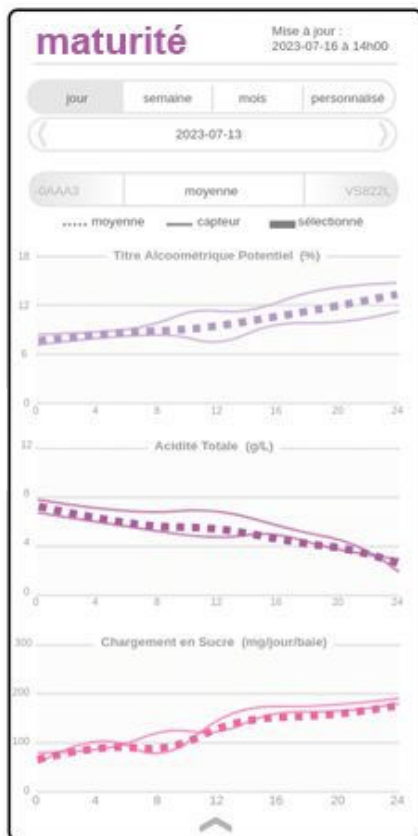
Asymptomatic

Diseased

Probability



BETA TESTING



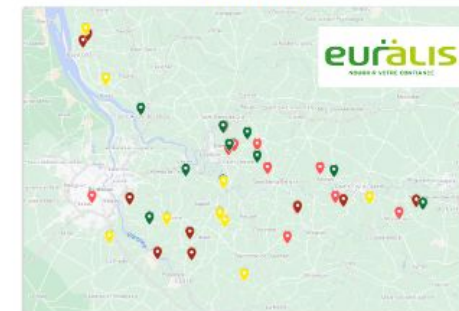
What's the point ?

- Track the maturity of your arrays in real time
- TAP, Total acidity, sugar loading speed
- Alert system
- In-app note-taking

To do what ?

- Save man time / multiplying measures
- Plan your harvest more finely
- Do not see its degree soar too quickly in a context of global warming
- Compare maturity curves from one year to the next to anticipate the profile of the vintage in the cellar

Bordeaux vineyard: 40 plots on 2 vintages:
2021 and 2022

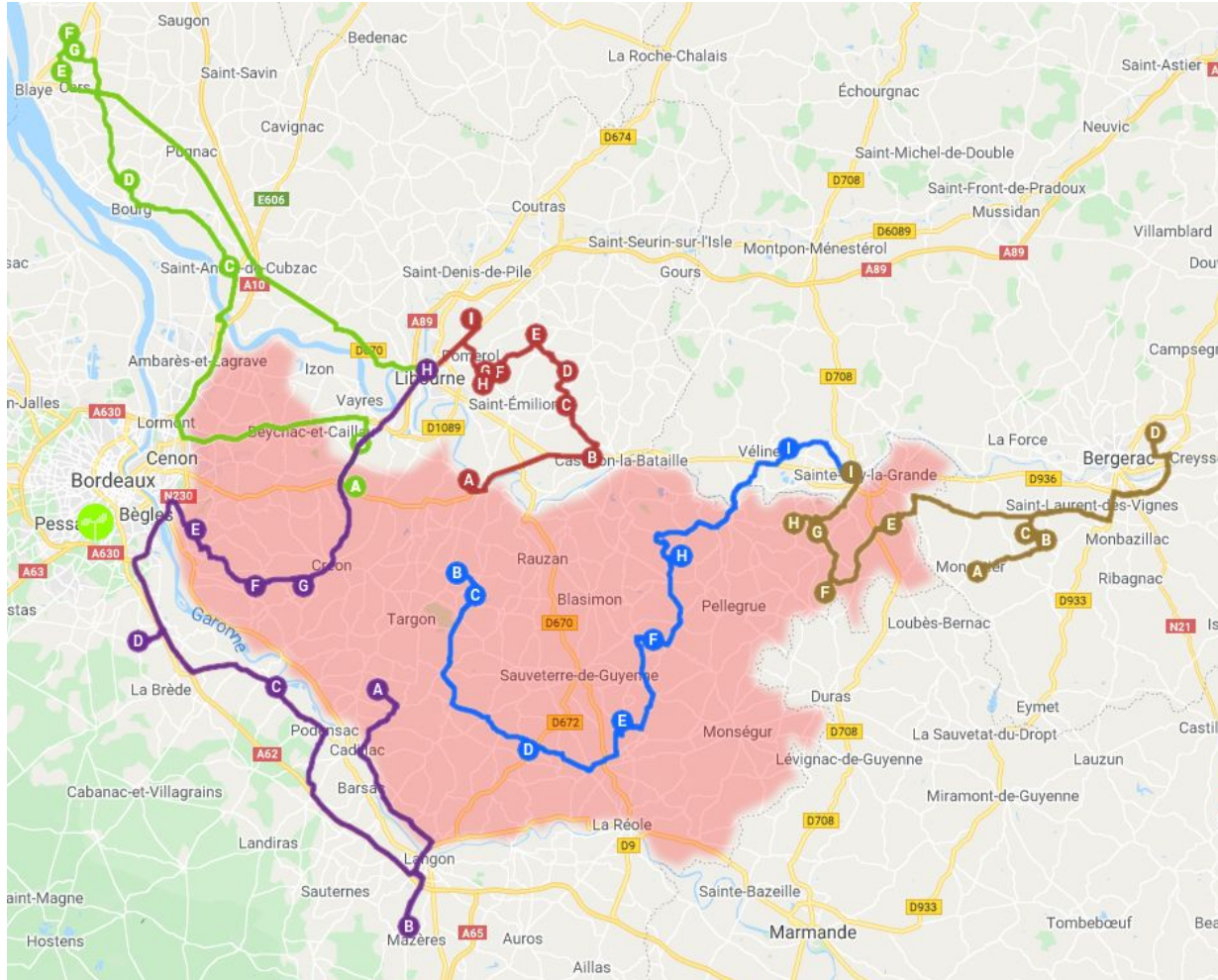


PACA vineyard: 40 plots in 2022



*Indicators calibrated on
120 plots over 2 vintages:
2021 and 2022
7 grape varieties*





Experimental vineyard = a network of 80 plots
40 entre-deux-mers + 40 languedoc/méditerranée

Merlot
noir



Cabernet
sauvignon



Cabernet
franc



Sauvignon
blanc

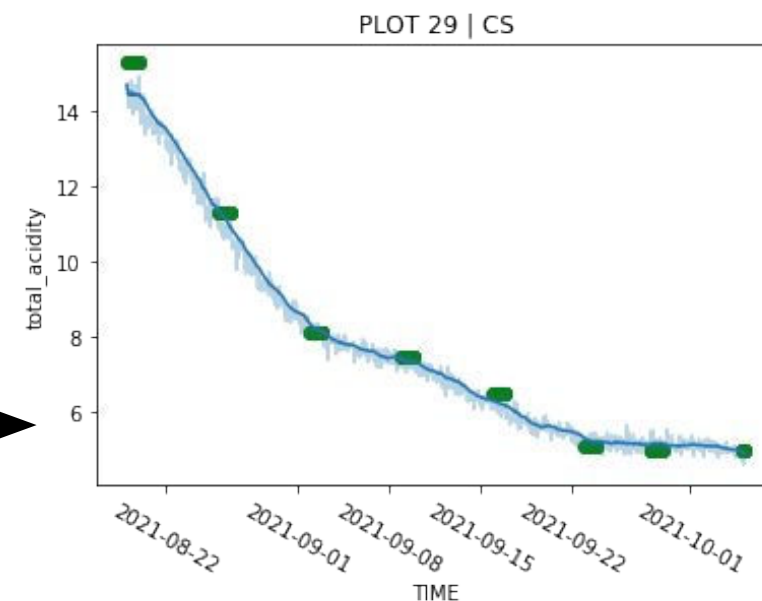
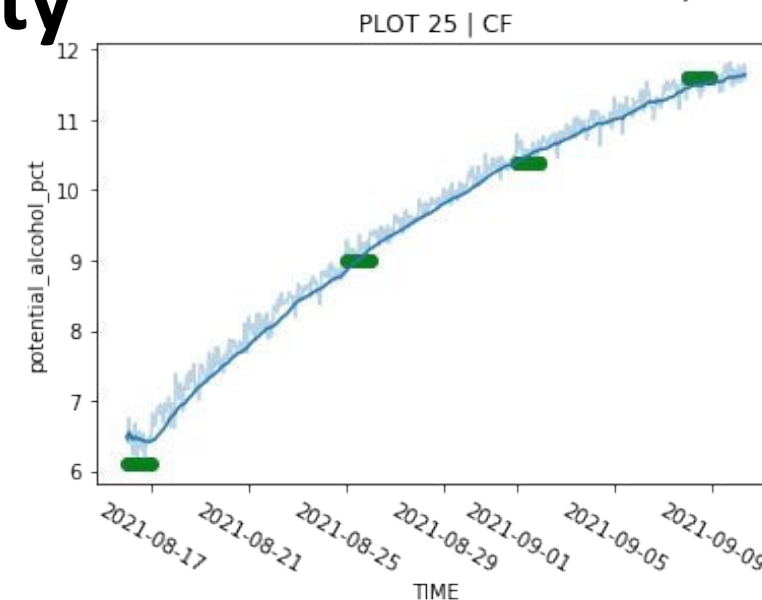


+ syrah, grenache & chardonnay

Technological Maturity

Listen to you crops !

Variété	TAP MAPE* (%)	TAP MAE*(% vol)	Acidité totale MAPE (%)	Acidité totale (H2SO4 g/L)
CF	2.2	0.2	3.1	0.2
CS	3.7	0.3	6.0	0.4
MT	2.9	0.3	5.2	0.3
SA	4.0	0.3	6.2	0.5
total	3.2	0.3	5.2	0.3

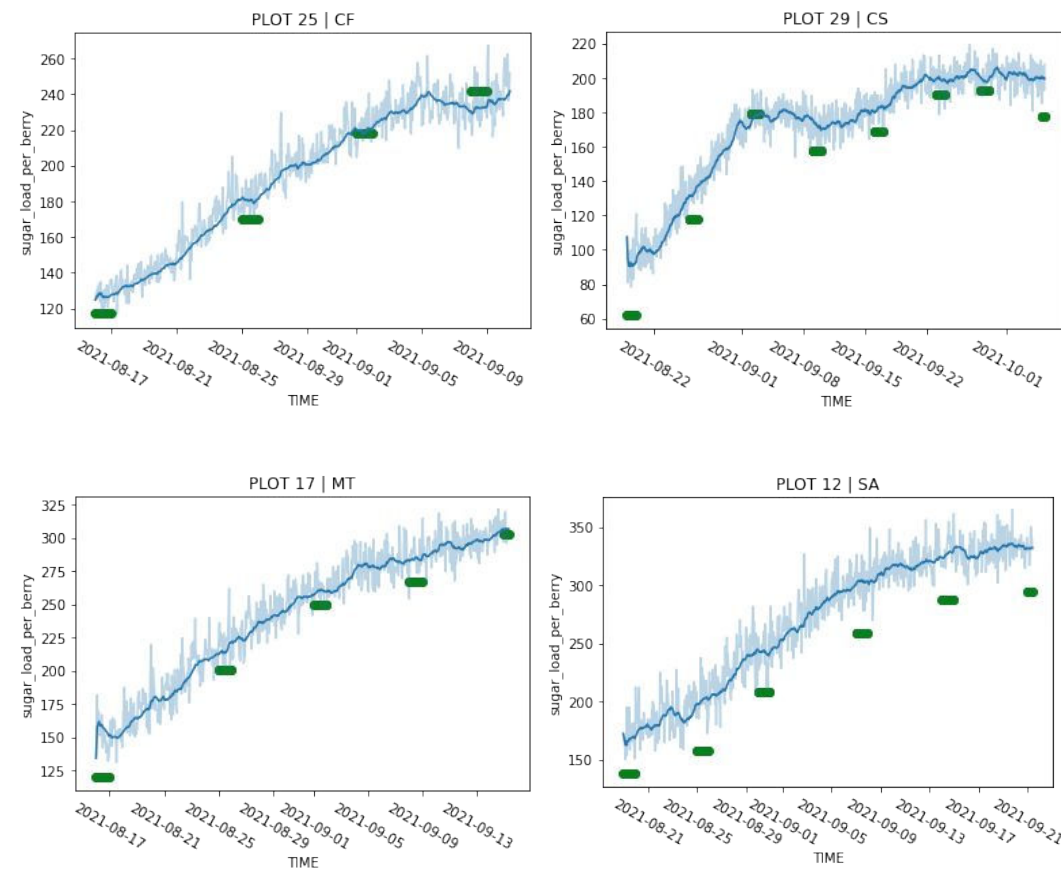


*MAE = Mean of average error

MAPE = Mean absolute percentage error in %



Varietals	MAPE (%)	MAE (mg / baie)
CF	6.4	14.5
CS	10.9	17.0
MT	8.3	18.7
SA	9.9	18.9
total	8.9	17.5



*MAE = Mean of average error

MAPE = Mean absolute percentage error in %





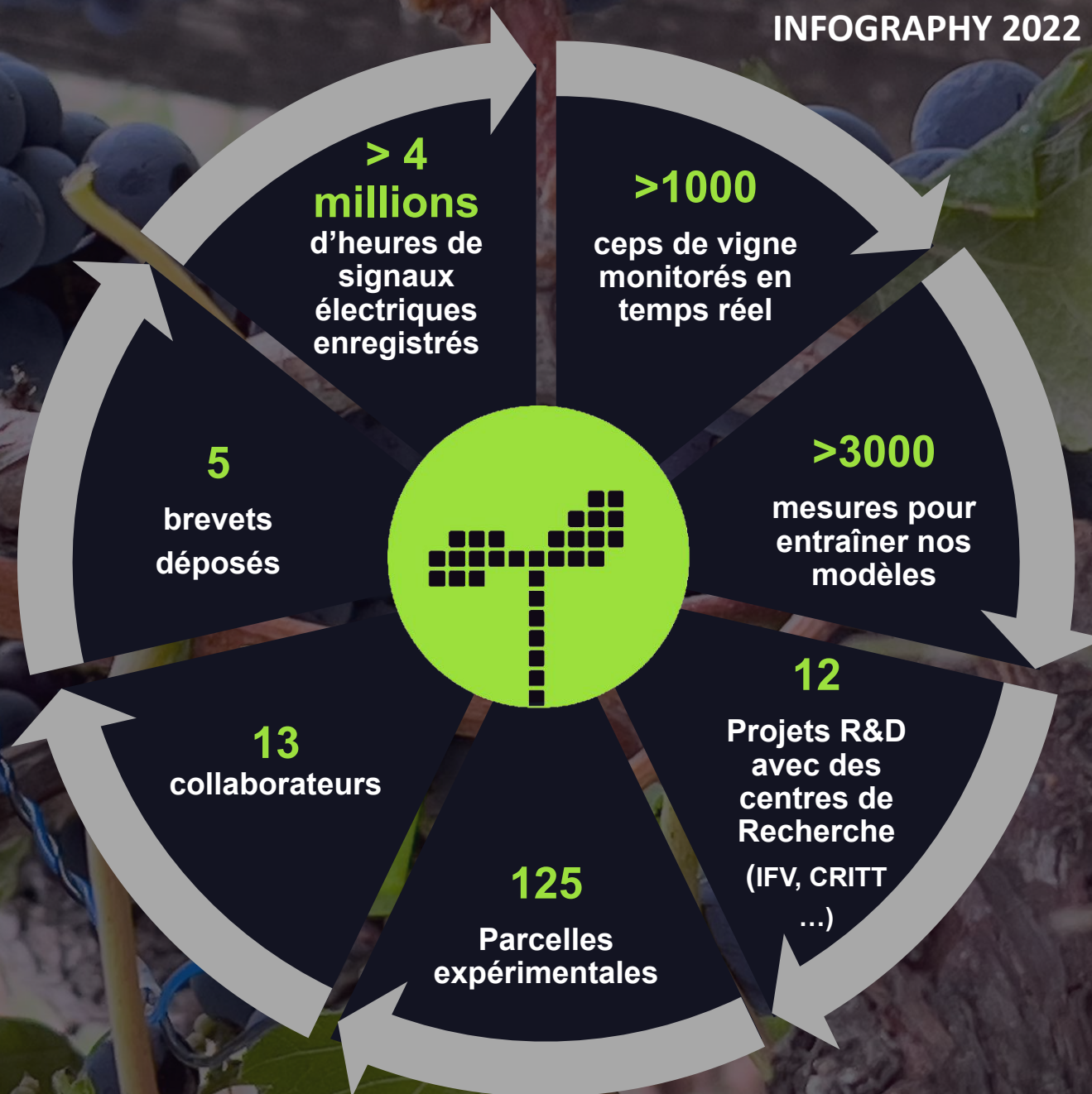
vegetalsignals

KEY STRENGTHS

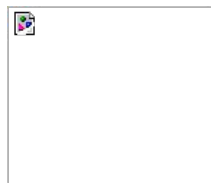
- Real-time monitoring
- Continuous service (no clouds dependent)
- Non-destructive technique
- Direct approach = at the core of the plant
- 1 multiservices sensor
- Energy autonomous
- Robustness (adapted to the vineyard)
- Easy installation
- An affordable price (no equipment cost)
- Alerts and notes-taking
- Simple and intuitive interface
- Reliable and trained models
- Made in Bordeaux



INFOGRAPHY 2022



In VS they trust !



...



Coming from R&D, the company relies on a highly qualified and interdisciplinary team



Agriculture & Agronomy



Fabian Le Bourdieu
Founder
CEO



Marine Lemoigne
Docteur en Agronomie
Lead Agronomy & Agriculture



Noëllie Gelin
Ing. agronomy&oenologist

Tech Integration



Jean-Etienne Morlighem
PhD Biotechnologies
Lead Operations



Gabriel Guillocheau
PhD Bio informatique
Real-time Data Pipelines



Marjorie Dabrin
Business Development
Viticulture

Models & Machine Learning



Paul Bui Quang
PhD Statistics
Lead Models &
Machine Learning



Lamiaa Ouzzine
PhD Bio informatique



Gwladys Ravon
PhD Mathematics

Hardware & design



Denis Le Hegarat
Eng. electronics



Robin Coste
Eng. Electronics



Riska Madisse
Administration & finance

TEAM