

You're a smart Apple Farmer, *but...* *are you as smart as your Apples?*



Vivent Biosignals bring the best of Swiss innovation to your orchard, by allowing you to **monitor your apple trees' health in real-time.**

Now that you can tap into your apple trees' intelligence, what will they tell you?

As world leaders in crop health monitoring technology, Vivent Biosignals uses artificial intelligence to decipher extracellular plant electrophysiological signals.

We provide you, the farmer, with:

- Crop health insights including specific abiotic and biotic stressors *long before visible symptoms.*
- Tools to help manage crop treatments for thinning, frost damage reduction and pest and disease management.
- An intuitive, interactive dashboard where you can monitor, your crop remotely, reliably and instantly.

Specific Biosignals, are translated into actionable Biobits*

**bite sized information, directly from your living crop – 24/7*

Detect stress when it happens!

Real time information, so you gain insights into your crop responses to a wide range of stimuli.



Climate



Developmental Stages



Drought



Nutrients



Biostimulants



Insects



Fungi



What is crop electrophysiology?

Plants use internal electrical, mechanical and chemical signalling networks to coordinate growth and defence. In response to (a)biotic stimuli the ion channels in many individual plant cells behave similarly, producing an electrical wave characteristic of that stimuli. **Advanced signal processing isolates this characteristic and provides an accurate diagnosis of the plant's condition in real time.**

Electrical signals are some of the fastest to spread information both locally and systemically, across the entire plant. Innovative electronics and artificial intelligence (AI), enables farmers to directly measure crop health, to optimise inputs and to assess stress prior to visible symptoms.

Early diagnosis of crop stress leads to more effective interventions and to actionable insights related to the timing and degree of plants' responses. Groups of treated and untreated or stressed and control plants are visible.

From root to shoot: You'll see it all

Unlike many other plant monitoring solutions, our biosensors also monitor what is happening in roots. Electrical signals are interpreted as they pass to and from the roots revealing problems in the substrate, such as fungal or nematode attacks, issues with irrigation / fertigation systems or poor soil quality.



Vivent, a Swiss-based scale-up and B Corporation, is the world leader in plant electrophysiology, with powerful intellectual property including patents, highly reputable research papers, the world's largest library of data and existing algorithms for the early diagnosis of soil pests, sucking and chewing insects on foliage, fungal and bacterial infections, water stress and nutrient deficiencies.

Industry coverage:

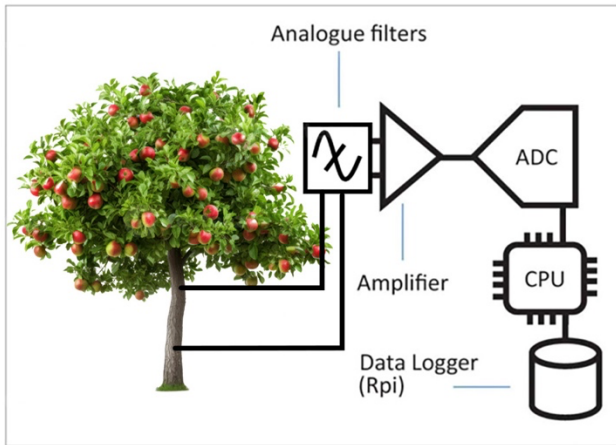
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EUROFRUIT





How it works

Two electrodes are attached to the trunk of an apple tree and its natural internal signals are amplified and recorded. The electrodes typically stay in place throughout a full crop cycle. We typically deploy 8 biosensors, each monitoring one apple tree, to compare treatment groups or different growing conditions. We provide an interface showing crop health and the presence of crop threats 24/7.

In real time, biosignals are processed using a library of diagnostic algorithms and plant response metrics. On your dashboard you will see 'Biobits'- actionable information, about your crop's health. You can trust this information, as crops know best!



Algorithms include a range of abiotic stresses, such as:

- Drought
- Response to crop treatments for thinning, pest and disease control
- Nutrient deficits (Nitrogen, Potassium, Phosphorus, Calcium, Iron, and Manganese)
- Plant vigour
- Water status
- Biotic stresses
- Mildew
- Response to light and soil conditions

But there's more...

- + Daily rhythms are clearly visible within your dashboard. Understanding plant daily rhythms help you schedule irrigation, fertilization, and harvesting for maximum yield.
- + Pest & Stress Responses: Plant responses associated with biotic stressors, such as pests or diseases are often visible well before damage is evident visually. Monitoring these patterns improves pest control strategies.

- + Responses to crop treatments that may be used to steer dormancy, thin flowers or fruit, or protect trees from pests or disease.
- + The efficacy of existing and/or new crop treatments is assessed immediately.
- + Results can be integrated with existing decision support tools.
- + Some clients report an overwhelming sense of amazement after connecting their crop. This is not guaranteed, but we'll bet you'll love it!

Working with YOU – our vision

Increase Apple Quality & Yields & Optimize Inputs

- Remote monitoring of your crops 24/7.
- Real-time insights into plants' responses to crop treatments.
- Quantified, real-time evidence of product efficacy.
- Alerts for pest & disease before visual symptoms are evident.
- Algorithms for new pests or diseases developed and added on request.
- Experienced senior plant and data science analysts to support you.



Contact
info@vivent.ch
www.vivent-biosignals.com