SENSEEN

NUTRISCOPE™
USER'S MANUAL

User Manual for Nutriscope™

English

FEBRUARY 2026

TABLE OF CONTENT

Safety instructions

General Safety Warnings

- Avoid Exposure to Liquids: Do not immerse the device in water or expose it to excessive moisture. Nutriscope™ is not waterproof, and liquid exposure may damage the device or cause malfunction.
- Handle with Care: Avoid dropping, striking, or applying excessive force to the device, as it may damage the sensors or internal components.
- Avoid direct eye exposure: Never look directly into the scanner's light source, especially. Prolonged exposure to ultraviolet or infrared light may cause eye strain or discomfort.
- Supervised use: Keep the device out of reach of children or individuals unfamiliar with its operation. Misuse may result in inaccurate readings or device damage.

Battery and Charging Safety

Use Approved Chargers Only: Always use a power source that complies with the following specifications:

- Input Voltage: DC 5V
- Input Current: 600 mA
- Avoid using fast chargers (e.g., 9V or 12V output) as they may damage the device.
- Charging Environment: Charge the device in a well-ventilated area, away from heat sources or direct sunlight.
- Battery Disposal: When disposing of the device or its battery, follow local regulations. In California and Canada, batteries must be recycled at designated facilities.

Operational Safety

- Avoid Extreme Conditions: Do not use the device in temperatures outside the range of 0°C to 45°C or in environments with high humidity (above 85%). Keep the device away from direct sunlight and extreme heat when not in use.
- Prevent Interference: Keep the device away from strong electromagnetic fields or medical equipment, such as pacemakers, to avoid interference.

Regulatory Compliance

- European Conformity. CE mark. This product is in "Compliance with the essential requirements of European legislation." This means that the product complies with all applicable European directives and regulations and that the manufacturer or importer has carried out the necessary assessments to ensure compliance. The CE marking certifies that the product can be placed on the European market.
- FCC Compliance (U.S.): This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference; (2) This device must accept any interference received, including interference that may cause undesired operation.

⚠ DISCLAIMER

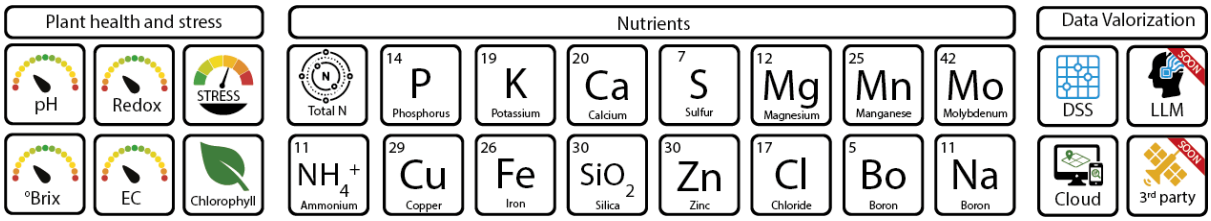
- Senseen shall not be held liable for any direct, indirect, incidental, or consequential damages resulting from the use, misuse, or inability to use the Nutriscope™ device, including but not limited to financial loss, crop yield reduction, or incorrect agricultural decisions.
- Nutriscope™ is a supplementary diagnostic tool designed to assist users in monitoring crop health by providing data-driven insights. However, it is not intended to replace the professional judgment, expertise, or decision-making of farmers, agronomists, or other agricultural professionals.
- Users are solely responsible for interpreting the data, making decisions, and taking appropriate actions based on their specific agricultural conditions. Senseen Inc. does not guarantee accuracy, completeness, or suitability of the information provided and shall not be liable for any damage or loss resulting from reliance on Nutriscope™ measurements or recommendations.
- By using this device, the user acknowledges and agrees to these terms and conditions of use. For best results, always consult agricultural experts and follow established farming practices alongside Nutriscope™ data.

1. Introduction

1.1. Nutriscope™: A lab and Crop Advisor in Your Pocket

Nutriscope is a groundbreaking scanner designed for farmers and agricultural professionals, providing real-time insights into plant stress, health, and overall vitality. By leveraging advanced photonics and artificial intelligence, Nutriscope measures a broad range of parameters—once obtainable only through expensive wet labs or complex field equipment—with just a single click.

Measuring plant health and stress: The device captures critical plant health and stress metrics using (pH, Redox, approach) On plant health, Nutriscope delivers a detailed nutrient analysis by quantifying essential components such as total nitrogen, ammonium, phosphorus, potassium, iron, sulfur, SiO_2, manganese, magnesium, calcium, boron, and chloride—data that is vital for optimizing fertilization strategies and maximizing yield. On plan stress Nutricope 's measurements offer a comprehensive view of plant condition, enabling the calculation of a stress index according to bioelectronic approach measuring the intensification of the living approach important when looking at agroecology practices.

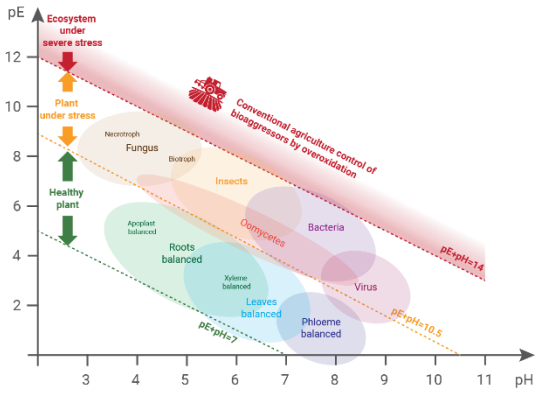


Your crop best ally: Beyond its measurement capabilities, Nutriscope is continuously enhancing its platform (https://portail.senseen.io/en) and app (Senseen Pencil) to unlock even more value for the farmer. The platform securely stores your field data and will soon integrate third-party sources, such as weather and satellite information, to offer broader perspectives that support your own analyses. Additionally, an upcoming field note feature will allow you to record geolocated notes directly from your phone, seamlessly linking your observations with precise field data.
Our first "redox" decision support system (DSS) is already deployed for select crops. This preliminary version will interpret scan results, providing recommendations for further diagnostic interventions—such as checking the root system—or offering targeted advice to optimize crop management. Our commitment to simplifying science will continue as we work toward developing a Large Language Model (LLM) that integrates best practices in crop management for something likes " a crop advisor in the pocket".

1.2. Agroecology at Your Own Pace

Nutriscope™ adapts to your journey toward sustainable agriculture, whether you're taking your first steps or enhancing existing practices. At the heart of sustainable agriculture lies agroecology, a science-based approach that leverages natural processes to build resilient farming systems, improve soil health, and enhance plant vitality. A key component of this approach is understanding the biochemical interactions within plants—specifically, the relationship between pH and redox potential, which serves as a fundamental indicator of plant health. More scientific information at https://link.springer.com/article/10.1007/s11104-021-05047-z

Reference framework: the pH/Redox cross: Nutriscope brings this concept to life with its innovative pH/Redox Cross measurement, a model developed by Olivier Husson[1] based on over three decades of research into redox regulation in biological systems. The pH/Redox Cross provides a framework to assess how plants respond to their environment, helping farmers identify whether their crops are thriving, experiencing stress, or struggling to maintain balance due to external pressures.



- At the core of this model lies the Green Zone, where plants function at their best, focusing energy on growth, nutrient absorption, and natural defenses. In this optimal state, crops are resilient, productive, and contribute to maintaining soil health. However, when exposed to stressors—such as drought, nutrient imbalances, or pest infestations—plants shift into the Orange Zone, where they redirect energy to mitigate damage, leading to slower growth and increased vulnerability to disease.

[1] Husson, O., Sarthou, JP., Bousset, L. *et al.* Soil and plant health in relation to dynamic sustainment of Eh and pH homeostasis: A review. *Plant Soil* **466**, 391–447 (2021). https://doi.org/10.1007/s11104-021-05047-z

- If stress continues to escalate, the plant may enter the Red Zone, where excessive oxidation disrupts its internal balance. This can be exacerbated by human interventions, such as the overuse of pesticides, which increase oxidative stress. In this state, plants can expend up to 80% of their energy on self-repair instead of growth, weakening their resilience and reducing overall yield.

Our stress index: To help farmers keep their crops in the Green Zone, Nutriscope provides a stress index derived from real-time pH and Redox measurements. By continuously monitoring these key indicators, farmers can detect early signs of stress, adjust management practices accordingly, and ensure crops remain in an optimal state for growth and productivity. With Nutriscope, agroecological principles are not just a philosophy but a practical, data-driven approach to achieving healthier crops, richer soils, and a more sustainable future.

1.3. Subscription

When you receive your Nutriscope, you can use it without a subscription for basic measurements (pH, Redox, Brix, Conductivity), total nitrogen, chlorophyll, stress index, and RedOx OAD by installing the Senseen app on your mobile phone.

To enhance your experience with the Nutriscope™, Senseen currently offers two subscriptions:
• An annual "Minerals" subscription (via the app): gives you access to mineral measurements on your mobile phone.
• An annual "Portal" subscription: gives you access to the Senseen portal, where you can view all your measurements, track their evolution, compare them, export them, and more.
A description of the difference with or without subscription is provided below:

Features	Without Subscription	With Subscription
Basic measurements (pH, Redox, Brix, Conductivity)	x	x
Total-Nitrogen, Chlorophyll	*	x
Stress Index	x	x
Nutrient levels		x
"redox" decision support systems	*	x
Futur Decision Support Systems		x
Cloud storage and history		x
Priority customer support		x

* When available

Why Subscribe?
Subscribing to Nutriscope unlocks a powerful suite of tools designed to help you make data-driven decisions for healthier crops, improved yields, and more sustainable farming practices. Here's why you should subscribe:

- **Comprehensive Plant Health Insights in Real Time**: Gain instant access to all measurement capability for your crops in seconds by being able to **analyze and compare** all your experience. Analyse your crop also with more available data (eg NDVI, weather, soils sensors.)
- **Access to Continuous advanced advices**: with all data available, we will provide IA engine to provide you suggestions of problems and solutions based on existing scientific literature and experiments
- **Data Storage & History**: Keep a history of your measurements in one place, track trends over time, and compare field conditions to make informed management decisions.
- **A Growing Agroecological Network**: Join a community of forward-thinking farmers, agronomists, and researchers working together to refine best practices based on real-world data.

By subscribing, you ensure that your Nutriscope remains at the cutting edge of agricultural technology, giving you the tools to farm smarter, optimize resources, and improve sustainability.

2. Key Features and Specifications

2.1. Features of Nutriscope™

The table below outlines the measurements and features available for each crop. We are continuously collaborating with partners to expand both the range of crops and the parameters we measure. Nutriscope's capabilities will be automatically updated as new measurements are validated and deemed reliable through ongoing training and development.

	Grape	Tomato	Potato	Wheat	Corn	Rapeseed	Melon	Orange	Banana
pH	✔	✔	✔	✔	✔	✔	✔	✔	*
Redox	✔	✔		✔	✔		✔	✔	*
Conductivity	✔	✔	✔	✔	✔	✔	✔	✔	*
Brix	✔			✔	✔		✔	✔	*
Chlorophyll				✔	✔				
Stress index	✔	✔		✔	✔		✔	✔	*
Total Nitrogen	✔	✔	✔	✔	✔	✔			
P- Phosphorus	✔	✔	✔	✔	✔	✔			
K- Potassium	✔	✔	✔	✔	✔	✔			
Fe- Iron	✔	✔	✔	✔	✔	✔			
Ca- Calcium	*	✔	✔	✔	✔	✔			
Mn – Magnesium	Beta	✔	✔	Beta	✔	✔			
Mg- Manganese	✔	✔	✔	✔	✔	✔			
Cl- Chlorine	✔	✔	✔	✔	✔	✔			
NH_4^+- Ammonium	✔	*	*	✔	*	✔			
SiO_2 - Silica	✔	✔	✔	✔	✔	✔			
B- Boron	✔	✔	✔	✔	✔	✔			
S- Sulfur	✔	✔	*	✔	✔	✔			
Na- Sodium	✔	✔	✔	✔	✔	*			
Mo- Molybdenum	*	✔	✔	✔	*	✔			
Cu- Copper	✔	*	✔	✔	✔	*			
Zn- Zinc	*	✔	✔	✔	✔	✔			
Cloud storage	✔	✔	✔	✔	✔	✔	✔	✔	*
DSS “redox”				✔	✔				

* = Available soon

BETA = Test mode

2.2. Technical Specifications

Nutriscope™ is built with state-of-the-art technology for precise and reliable performance:

Parameter	Details
Measurement Metrics	nutrients, stress indexes(pH, Redox, Brix, conductivity,)
Scanning Technology	NIR-VIS-UV (200–1,700 nm) spectral range
Scanning Time	3 seconds per scan
Weight	7 oz (200 grams), scanner and handle
Dimensions	Compact and handheld design. Leaf gripper: 3.93*4.3*1.18 inches. Nutriscope: 3.54*0.78*0.78 inches
Power Source	Rechargeable Li-Polymer battery (via USB-C)
Input	DC 5V ⎓ 600 mA

Parameter	Details
Capacity	620 mAh 3.7V 2.3 Wh
Connectivity	Wireless (Bluetooth)
Operating Environment	0°C to 45°C, humidity up to 85%
Software Integration	Works with Nutriscope™ app (Senseen Pencil) or web platform (https://portail.senseen.io/en)
FCC ID	2A8HHNT-BL-G1

2.3. Software and App Features

Nutriscope™ integrates seamlessly with the Nutriscope™ (Senseen Pencil) App and platform (https://portail.senseen.io/en), providing a user-friendly interface and advanced functionality:

- **Data Visualization:** View results in graphs, charts, and maps.
- **Customizable Profiles:** Add and manage different crop profiles for tailored monitoring.
- **Cloud Syncing:** Automatically backs up and syncs data across devices.
- **Multi-Language Support:** Available in multiple languages for global accessibility.

3. Getting Started

This section provides all the essential steps to set up your Nutriscope™ device and start using it effectively. Follow these instructions to ensure a seamless experience.

3.1. Unboxing Your Nutriscope™

When you receive your Nutriscope™ package, ensure it includes the following items:

- Nutriscope™ device: Scanner and handle
- Charging cable (USB-C)
- Protective carrying case
- Quick start guide

If any item is missing or damaged, contact Nutriscope™ customer support immediately.

3.2.

3.3. How To Use Your Nutriscope™

Step 1: Charging Nutriscope

- Use the included USB-C cable to connect Nutriscope™ to a power source that meets the required technical specifications (DC 5V, 600 mA).
- A full charge takes approximately 2 hours. The charge level will **only** be displayed on the mobile interface, once the scanner has been paired with your phone, in the "scan" section.

Step 2: Downloading the Nutriscope™ App

The Nutriscope app is available for both Android and iOS devices. To download, search for "Senseen Pencil" in your app store or visit the links below depending on your device type:

- Download "Senseen Pencil" App on **App Store**:
- Download Senseen App for **Android**:

Quick Start Check List

- ☐ Charge Nutriscope
- ☐ Download App on your phone
- ☐ Enable Bluetooth on your phone
- ☐ Enable geolocation on your phone
- ☐ Get your account
- ☐ Login on the App
- ☐ Pairing the device
- ☐ Select product to scan
- ☐ Choose measurement type
- ☐ Scan

Step 3 : Enable Bluetooth and geolocation

To ensure Nutriscope™ works properly, you need to enable Bluetooth and Geolocation (GPS) on your device. When you open the app, you will be prompted to grant permissions for Bluetooth and GPS location services; please accept to ensure proper functionality. You can also follow the indication below:

⚠️ **Important**: Do NOT pair Nutriscope™ directly from your phone's Bluetooth settings. Instead, follow the steps below and complete the pairing process inside the Senseen App.

Enable Bluetooth • Open Settings on your Android device. • Tap Connected devices, Bluetooth or Connections (varies by device). • Toggle the Bluetooth switch ON. • Do not select Nutriscope™ in the Bluetooth menu. Instead, open the Senseen App and follow the in-app pairing instructions. **Enable Geolocation (GPS)** • Open Settings on your Android device. • Tap Location. • Toggle the Location switch ON. • Tap App permissions or Location Services.	**Enable Bluetooth** • Open Settings on your iPhone. • Tap Bluetooth. • Toggle the Bluetooth switch ON. • Do not pair Nutriscope™ from this menu. Instead, open the Senseen App and complete the pairing process there. **Enable Geolocation (GPS)** • Open Settings on your iPhone. • Scroll down and tap Privacy & Security. • Tap Location Services. • Toggle Location Services ON. • Scroll down to find the Senseen App and select: • "While Using the App" for normal operation.

• Find the Senseen App and select "Allow while using the app" (or "Allow all the time" for continuous use).	• "Always" if continuous background tracking is needed. • Ensure "Precise Location" is ON to improve accuracy.

💡 Troubleshooting Tips

- If Nutriscope™ doesn't connect, make sure you haven't paired it directly from the phone's Bluetooth settings. Unpair it if needed and retry via the Senseen App.
- Restart your phone if Bluetooth or Location services don't work properly.
- For Android, ensure Google Location Accuracy is enabled in the Location Settings for better positioning.
- Make sure the Senseen App has all necessary permissions (Bluetooth, Location, Notifications).
- Some Android versions require both Bluetooth and Location to be enabled for successful device discovery.

Step 4: Login on the App

When you receive your Nutriscope, you will need to register your product and request account creation to access the platform. This registration is essential to associate the data collected by your Nutriscope with the correct user and to provide access to Senseen's platform. To complete your registration, follow these steps:

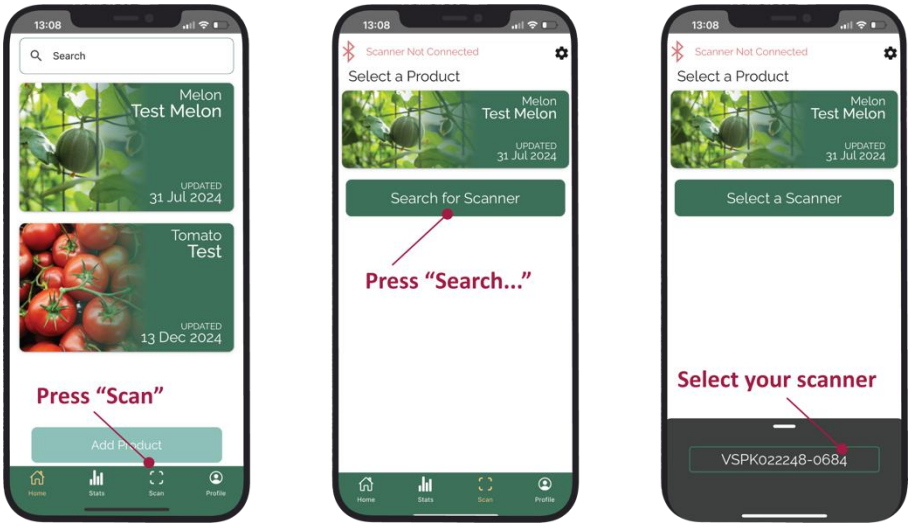
1. Request an account on Senseen's website: www.senseen.io/support
2. Select the purpose: "New Account Creation"
3. Fill out the form,
4. Registering multiple users: If you need to add multiple users, use the "Additional Users" field. Enter one user per line, specifying the name, email address, and scanner ID for each.

Once submitted, our team will process your request, and you will receive confirmation when your account is activated. You will then be able to connect to the App.

Step 5: Pairing the device

Note : We call crop a "product" as the Nutriscope is very generic and same app can measure for instance milk so to be generic here "product" is the sample to scan, in most case for farmer is a crop.

1. On the home page, you will see all the products you have created and have the option to add a new one. To create a new product for monitoring, click "Add Product" and select the crop type, enter a title, and optionally provide a description.
2. Choose the product you want to analyze from your list of saved products.
3. Turn on Nutriscope™ by pressing the power button until the Blue LED indicator blinks.
4. In the app, when you've chosen a product, press "scan", a button with "Select a Scanner" will appear as well as the scanner ID number (VSPK######-####) of all scanners within range. If no scanners are detected, press "Search scanner" or verify that Bluetooth and geolocation are activated (Step 3).
5. Select the scanner you want to pair with your mobile phone. Only one scanner can be paired at a time.
6. Once the connection is successful, the device's LED will stop blinking and remain solid blue a notification displaying "Scanner connected", its ID, and the battery status will appear. If the battery is low (indicated in red), please charge the device before proceeding.



Step 6: Select product to scan

- Select the Product to Scan: From the Home menu, choose the product you want to analyze (e.g., tomato, grape). The app will automatically navigate to the Stats menu, where you can view all previous measurements for the selected product.
- Initiate Scanning: Tap the Scan button to begin the scanning process.

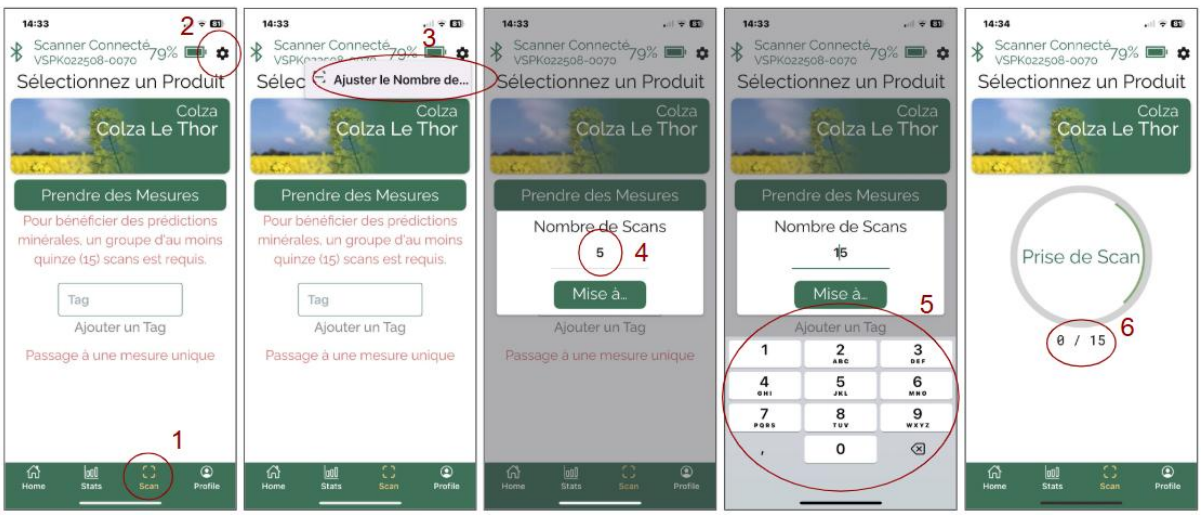
Step 7: Choose measurement mode

Nutriscope™ offers two types of measurements:

- **Group Measurement Scan**: This mode is the "normal" one requires multiple scans before calculating an average absorption curve, providing results based on the aggregated data. Group measurements are strongly recommended, as they align with Nutriscope's original calibration, ensuring higher accuracy and reliability.
- **Single Measurement Scan**: This mode provides results from a single scan, but it is **not recommended** as it may be less accurate due to natural variability in plant samples.

By default, the app is set to Group Measurement mode with five scans. To adjust this number, tap the Settings icon (gear icon) on the top right hand corner and update the value as needed.

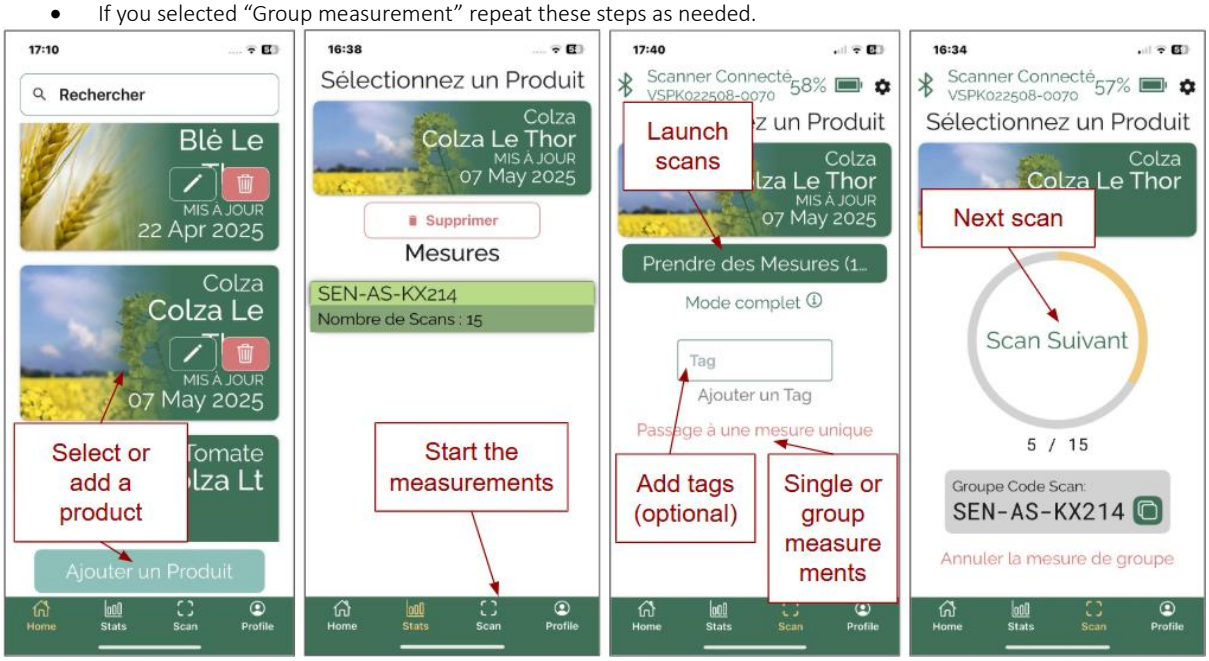
For best practices on sampling methods, refer to the next section of this document.

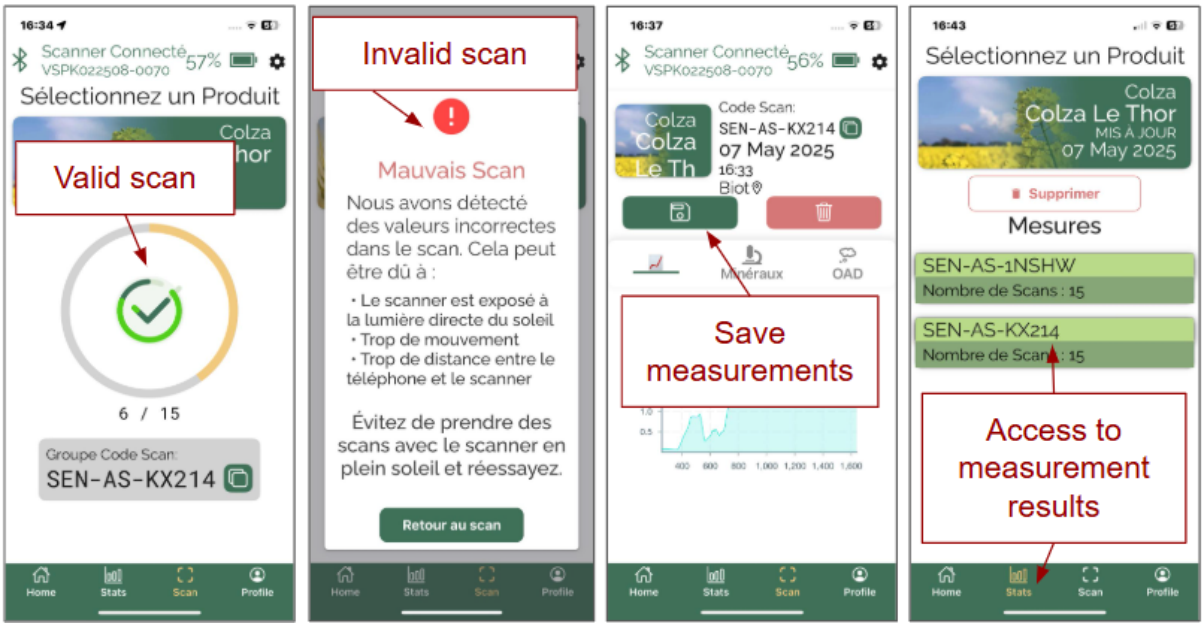


- If you focus on measurement parameters such as **pH and Redox**, we recommend choosing a setting of **5 scans** minimum. Look at various protocols on our website
- If you focus on **nutrients**, you need to set group of **15 scans** to match as best as possible the method used by Senseen during calibration.
- If you are looking for additional guidance, we recommend consulting the best practices for sampling developed by our partner Novacrops here:
  - English

Step 8: Scan

- Name your scan (optional): Fill the “Tag” field to give a name to your scan
- Prepare sample: Select the leaf you want to analyze and place it in the “leaf clipper”. Close the clip and make sure outside light cannot hinder the quality of the scan.
- Launch scan: Press “Take a measurement”. Wait for few seconds to access scan results.
- If you selected “Group measurement” repeat these steps as needed.





Best Practices for Accurate Scanning

- **Consistency**: Repeat your measurement process as consistently as possible (e.g., selecting the same leaves, measuring at the same time of day). This will provide a clearer understanding of the trends affecting your crop.
- **Sensitive Measurements**: If measuring sensitive parameters like Redox, perform measurements early in the morning (before 9 AM) as photosynthesis can introduce significant variations in your readings.
- **Sample Placement**: Ensure the scanner is in full contact with the sample surface and prevent any external light interference for precise measurements.
- **Cleanliness**: Wipe the scanner sensor with a soft, lint-free cloth after each use to prevent cross-contamination.
- **Environment**: Avoid scanning in extreme weather conditions or direct sunlight, as these may affect sensor performance.

Step 9: Analyze

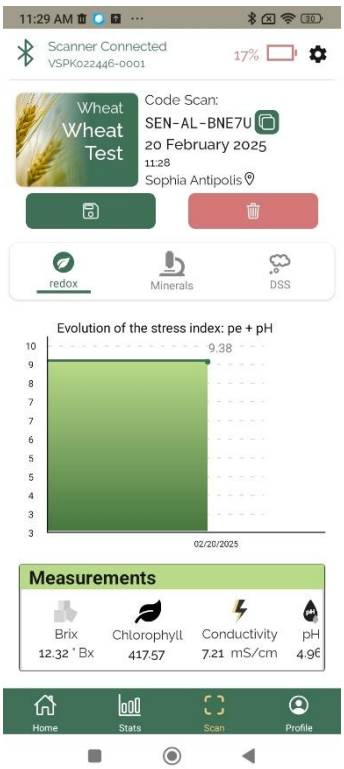
⚠️ Press “Save Scan” to make sure, your data is stored on the platform or “Delete scan” if you are not satisfied.

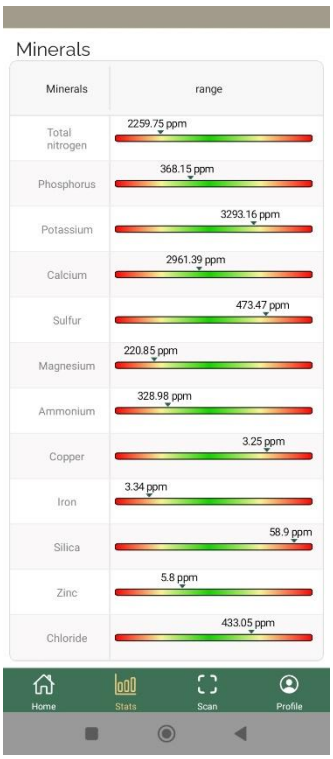
With your subscription, all measurements are automatically saved in the cloud under the product's profile, and will also be accessible on the Senseen’s platform and mobile App. The results are visualized in graphs and charts for easy interpretation. You can also compare them with historical data to identify trends or anomalies.

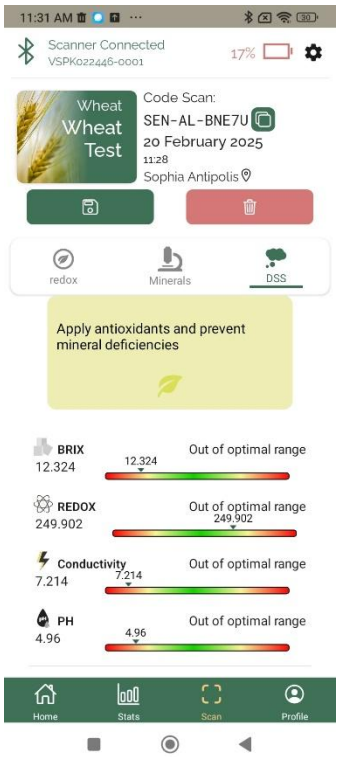
Once the scan is complete, the app will display the results, including key metrics such as:

- Stress parameters such PH , Redox and EC levels: Indicators of soil or crop health. Together with Brix levels: Measure of sugar content in fruits or vegetables. Chlorophyl can also be provided
- Nutrient concentrations: Insight into the nutritional profile.
- Redox DSS when available to interpret the Stress parameters

View of the 3 possible analyses:
Screen 1: stress index and pH, redox, conductivity, Brix
Screen 2: minerals and trace elements
Screen 3: DSS redox on the interpretation of the results of screen 1







3.4. Contributor Mode

This is a special mode not to use in usual operation. In your profile settings, you will find an option for "Contributor Mode", which should remain disabled during normal use. Contributor Mode is designed for partners and researchers who wish to assist in calibrating Nutriscope™ for new crops. By enabling this mode, users can contribute valuable scan data to improve measurement accuracy. If you're interested in collaborating, please visit our contact form at:
www.senseen.io/contact

4. Sampling Best Practices

To maximize the accuracy and consistency of your Nutriscope™ measurements, follow our measurement protocols available on our website in the "Scan" section, as well as the recommended best practices:

P K N 15	**Use 15 scans** (group measurement) when focusing on nutrient analysis for the most reliable data.
Redox 5	**Use minimum 5 scans** (group measurement) when assessing plant stress (e.g., Redox measurements).
	Maintain consistency in your sampling practices to track trends effectively over time and improve decision-making.
	Sample early in the morning, before 9 AM to minimize variability caused by photosynthesis
	You can Sample young and old leaves separately if you want to analyse nutrient movements.
	Avoid sampling the leaf petiole (leaf stalk) as it may affect measurement consistency.
	Do not sample from areas such as side paths or headlands, as these locations may not be representative of the crop.
	Separate deficient leaves from healthy leaves to better understand stress conditions and nutrient imbalances.
	Ensure samples are free from dew, moisture, or dirt to prevent contamination and inaccurate readings.
	Collect samples before foliar spray application or wait at least one week after application to avoid interference from treatments.
	Refer to detailed sampling best practices for additional guidance on proper collection techniques (see below).

Following these guidelines will help you obtain the most reliable and actionable data for optimizing plant health and nutrient management. If you are looking for additional guidance, we recommend consulting the best practices for sampling developed by our partner Novacrops and used by Senseen for calibration purpose, here:

- English

5. Portal

Thanks to the Senseen portal: https://portail.senseen.io, you can access all your measurements and get a comprehensive view of statistics and minerals. You'll be able to select the periods you're interested in, make comparisons, visualize trends, see the optimal ranges for each measured element… and most importantly, you'll have the ability to export your data.

Access to the Senseen portal requires a **subscription to the annual portal subscription**, available in the store.

Your access credentials will be the same as those provided for the Senseen app.

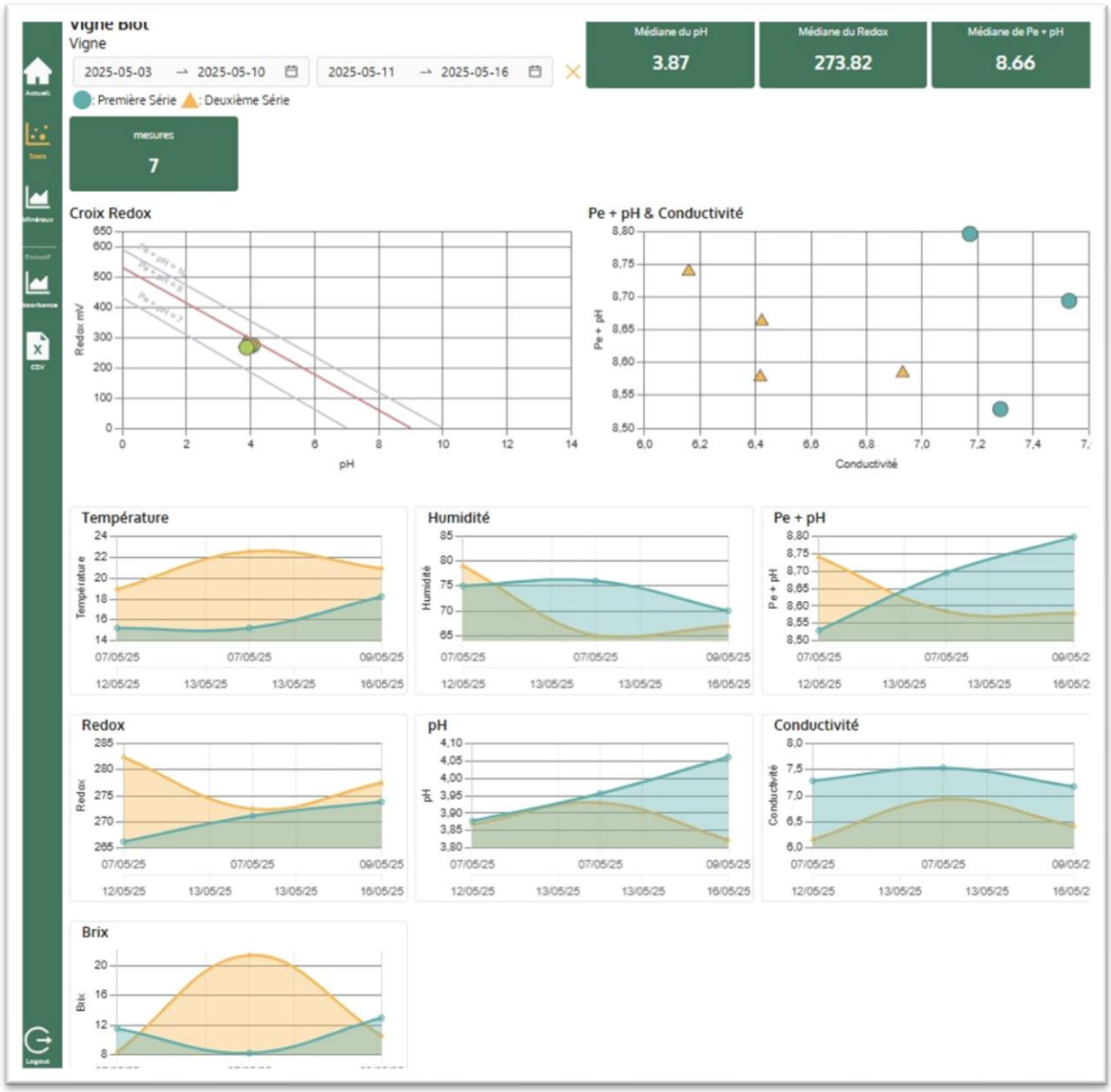
5.1. The "Stats" Tab

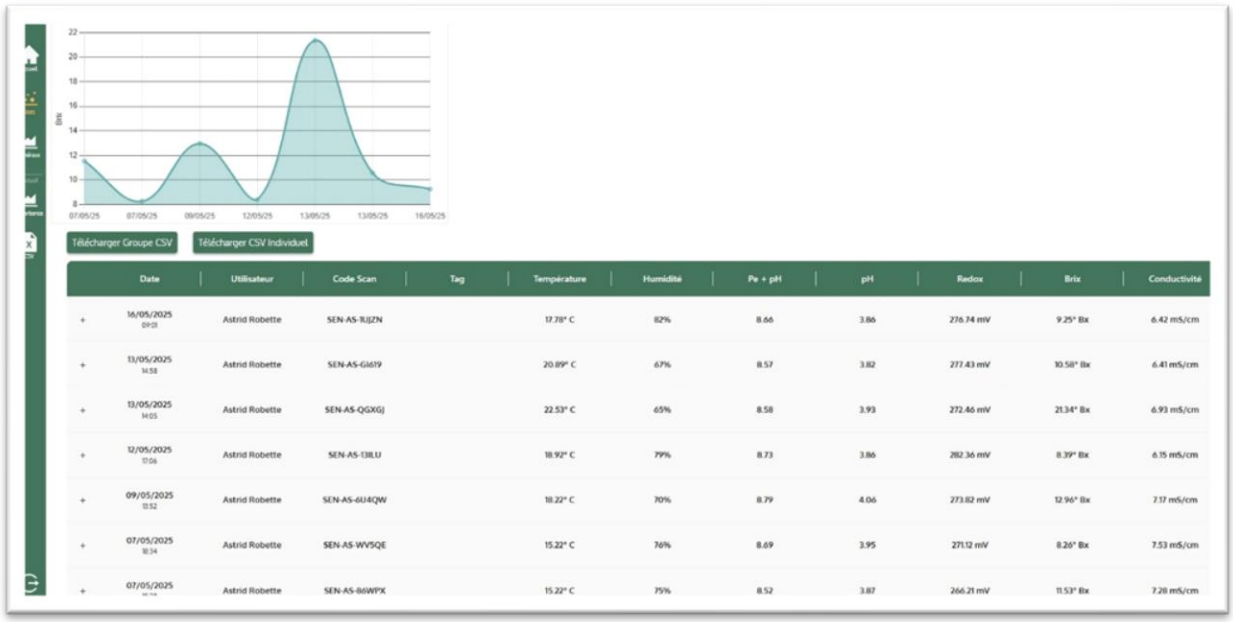
In this tab, you'll find the results of your measurements for:

- RedOx
- pH
- Pe + pH
- Conductivity
- Brix
- Temperature

- Humidity

You can customize the data display by time period or for a specific date, and also compare multiple time periods.
The first section of this tab displays your data as graphs, while the second section shows your data in a table format, with each row representing one measurement. For each of them, you can view the detailed scans that make up the measurement.
Finally, the **"Download Group CSV"** button lets you export all your measurements (average of the scans) into a .csv file, while the **"Download Individual CSV"** button allows you to export all individual scans.





5.2. The “Minerals” Tab

In this tab, you'll find the results of your measurements for mineral and trace element content, including: **Total N, NH4+, P, K, Ca, S, Mg, Cl, Zn, Fe, Cu, SiO_2**, and soon **Mn** and **Bo**.
As with the “Stats” section, you can customize the display of data by time period and also change the visual rendering: graphs, tables, or curves.
For each mineral and trace element, the optimal range is shown, along with the current status of your crop (Excess, Normal, Deficient) relative to that range. The trend (R^2) is also indicated.
The **“Export Mineral Data”** button allows you to download either a **detailed report** containing:

- Summary statistics
- Mineral analysis by measurement
- Data visualizations
- Interactive tables
- Health status indicators

Or **raw data** that you can use to create your own custom analyses.

Vigne Biot

May 7 - May 19, 2025

Date de début → Date de fin | Graphiques | Tableaux | Exporter les données minérales

sulfur

JPG

Sulfur 309.70 ppm | 15x | Niveau Normal

Variation 24h	Moyenne sur 7 Jours	Min	Max
-42.1%	322.00	309.70	932.88

Tendance générale à la baisse (R^2 = 0.042)

Plage Optimale: 130 - 430

phosphorus

JPG

Phosphorus 421.68 ppm | 15x | Niveau Normal

Variation 24h	Moyenne sur 7 Jours	Min	Max
+17.4%	410.64	341.93	421.68

Tendance générale à la hausse (R^2 = 0.358)

Plage Optimale: 340 - 590

potassium

JPC

Potassium 1876.99 ppm | 15x | Niveau Normal

Variation 24h	Moyenne sur 7 Jours	Min	Max
-26.0%	1875.20	1668.28	1876.99

Tendance générale à la hausse (R^2 = 0.683)

Plage Optimale: 1475 - 2275

copper

JPG

Copper 2.62 ppm | 15x | Niveau Normal

Variation 24h	Moyenne sur 7 Jours	Min	Max
-42.6%	2.38	0.86	3.40

Tendance générale à la baisse (R^2 = 0.021)

Plage Optimale: 0.45 - 3.15

chloride

JPG

Chloride 566.89 ppm | 15x | Excès

Variation 24h	Moyenne sur 7 Jours	Min	Max
-22.1%	483.24	294.12	710.13

Tendance générale à la hausse (R^2 = 0.118)

Plage Optimale: 110 - 330

total nitrogen

JPC

Total Nitrogen 2003.95 ppm | 15x | Excès

Variation 24h	Moyenne sur 7 Jours	Min	Max
-17.9%	1881.12	1472.03	2229.19

Tendance générale à la baisse (R^2 = 0.013)

Plage Optimale: 460 - 720

sulfur

CSV

Moyenne	Médiane	Écart-Type	Plage
501.57 ppm	412.73 ppm	198.68 ppm	598.56 ppm

Date	Valeur	Statut	Écart	Mesuré Par
16/05/2025 08:57	334.31 ppm	Niveau Normal	-33.35%	Astrid Robette
13/05/2025 14:55	412.73 ppm	Niveau Normal	-17.71%	Astrid Robette
13/05/2025 14:05	932.88 ppm	Excès	+85.99%	Astrid Robette
07/05/2025 18:28	368.22 ppm	Niveau Normal	-26.59%	Astrid Robette
07/05/2025 18:31	636.07 ppm	Excès	+26.82%	Astrid Robette
09/05/2025 13:46	452.23 ppm	Excès	-9.84%	Astrid Robette
12/05/2025 17:04	374.55 ppm	Niveau Normal	-25.32%	Astrid Robette

phosphorus

CSV

Moyenne	Médiane	Écart-Type	Plage
376.22 ppm	399.60 ppm	33.88 ppm	93.19 ppm

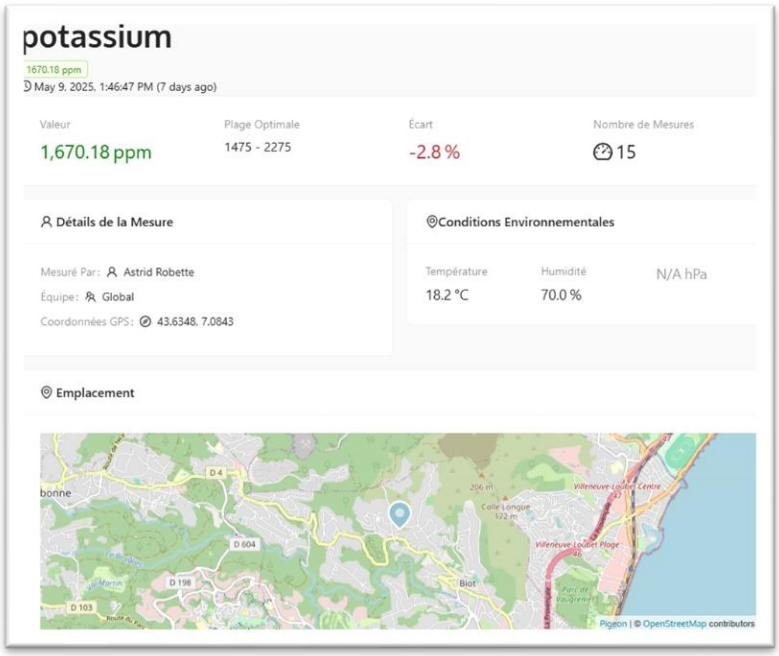
Date	Valeur	Statut	Écart	Mesuré Par
16/05/2025 08:57	399.60 ppm	Niveau Normal	+6.21%	Astrid Robette
13/05/2025 14:55	402.85 ppm	Niveau Normal	+7.08%	Astrid Robette
13/05/2025 14:05	312.80 ppm	Déficient	-16.86%	Astrid Robette
07/05/2025 18:28	401.53 ppm	Niveau Normal	+6.73%	Astrid Robette
07/05/2025 18:31	341.93 ppm	Niveau Normal	-9.12%	Astrid Robette
09/05/2025 13:46	368.85 ppm	Niveau Normal	-1.96%	Astrid Robette
12/05/2025 17:04	406.00 ppm	Niveau Normal	+7.91%	Astrid Robette

potassium

CSV

Moyenne	Médiane	Écart-Type	Plage
1,796.22 ppm	1,712.12 ppm	198.41 ppm	586.28 ppm

Date	Valeur	Statut	Écart	Mesuré Par
16/05/2025 08:57	1873.42 ppm	Niveau Normal	+4.30%	Astrid Robette
13/05/2025 14:55	1678.36 ppm	Niveau Normal	-6.56%	Astrid Robette
13/05/2025 14:05	1712.12 ppm	Niveau Normal	-4.68%	Astrid Robette
07/05/2025 18:28	1668.28 ppm	Niveau Normal	-7.12%	Astrid Robette
07/05/2025 18:31	2254.56 ppm	Niveau Normal	+25.52%	Astrid Robette
09/05/2025 13:46	1670.18 ppm	Niveau Normal	-7.02%	Astrid Robette
12/05/2025 17:04	1716.64 ppm	Niveau Normal	-4.43%	Astrid Robette



6. Maintenance and Troubleshooting

This section provides guidance on maintaining your Nutriscope™ for optimal performance and resolving common issues that may arise during use.

6.1. Maintenance Tips

To keep your Nutriscope™ functioning at its best, follow these maintenance guidelines:

- Cleaning the Sensor:
  - After each use, gently clean the sensor with a soft, lint-free cloth dampened with a mild cleaning solution or isopropyl alcohol.
  - Avoid abrasive materials or harsh chemicals that could damage the sensor.
- Protecting the Device:
  - Store the Nutriscope™ in the provided protective case when not in use.
  - Keep the device in a cool, dry place away from direct sunlight, dust, and moisture.
- Battery Care:
  - Use only a compatible USB-C charger that meets the technical specifications (DC 5V, 600 mA).
  - Avoid letting the battery fully deplete. Charge the device when the battery indicator falls below 20%.
- Software Updates:
  - Regularly update the Nutriscope™ app to ensure you have the latest features, crop calibrations, and security enhancements.

6.2. Troubleshooting Common Issues

Here's how to resolve common problems you might encounter with your Nutriscope™:

- Device Won't Turn On:
  - Ensure the device is charged. If it doesn't respond, connect it to a power source and try again after a few minutes.
- Device Fails to Connect to the App:
  - Confirm that Bluetooth and geolocation enabled on your smartphone.
  - Restart both the device and the app.
  - Ensure the device is not paired with another app or account.

    - Make sure you connect the scanner through the Senseen App and not through your mobile phone Bluetooth setting.
- Inaccurate or Unstable Measurements:
    - Clean the sensor and ensure the sample is properly positioned.
    - Verify that the sample type matches the selected crop in the app.
- Error Messages During Scanning:
    - Refer to the on-screen instructions to address the error.
    - If unclear, consult the FAQs in the app or the troubleshooting section on the Nutriscope™ website.
- App Crashes or Freezes:
    - Ensure your app is updated to the latest version.
    - Restart the app and clear the app cache if necessary.

7. Maintenance and evolutions

Nutriscope™ is equipped with cutting-edge features that go beyond basic crop health monitoring. These advanced functionalities are designed to provide deeper insights, improve ease of use, and integrate seamlessly into modern agricultural workflows. Below is a detailed overview of these advanced features:

Nutriscope™ Software Updates

Nutriscope™ frequently releases software updates to optimize device performance, introduce new features, and expand crop support. These updates include:

- Enhanced scanning algorithms for improved accuracy.
- New crop calibration profiles to extend functionality.
- Security patches and bug fixes for a seamless experience.

Calibration Updates: Calibration updates, such as new measurements or crop profiles, are automatically applied and do not require action from you.

Mobile App Updates: To update the Nutriscope™ mobile app:

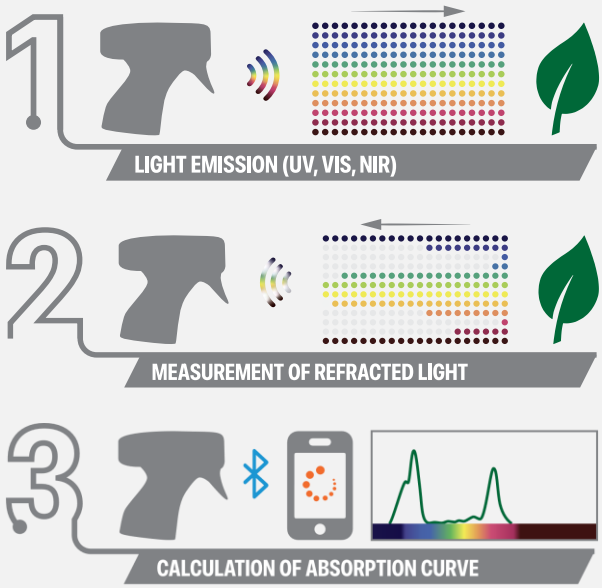
1. Ensure your mobile phone is connected to the internet.
2. Wait for a notification from the app when updates are available.
3. Follow the on-screen prompts to download and install the updates.

8. Theory of operations

8.1. How does Nutriscope works

Nutriscope™ works by shining light onto a plant and measuring how much is absorbed, reflected, or transmitted. Just like a fingerprint, each plant compound (chlorophyll, nutrients, stress markers) interacts with light in a unique way. Nutriscope™ analyzes these interactions to give you real-time crop health insights.

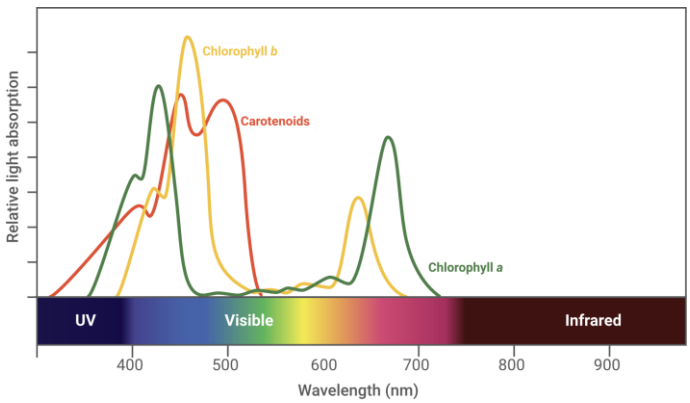
Nutriscope™ operates using a three-step process that allows for real-time, non-invasive crop health analysis:



Emission of Light onto the Plant: The device emits light from a set of LEDs at specific UV, visible, and near-infrared (NIR) wavelengths. These wavelengths are carefully selected to target key biochemical properties of the plant, such as chlorophyll content, nutrient levels, and stress markers.

Reception of Refracted Light: As light interacts with plant tissue, certain wavelengths are absorbed, while others are reflected. Nutriscope™'s optical sensor precisely captures the intensity of reflected light across different wavelengths, allowing for detailed spectral analysis.

Calculation of the Absorption Curve: Nutriscope™ determines the absorption curve by analyzing the difference between emitted and received light. This curve serves as a unique spectral fingerprint, revealing the plant's chemical composition. Distinct peaks and valleys in the absorption curve—or complex patterns detected through AI-powered analysis—indicate how specific plant compounds, such as chlorophyll and nutrients, interact with light. By decoding these patterns, Nutriscope™ quantifies key plant health parameters, delivering actionable insights to optimize crop management.



The Nutriscope™ captures the absorption curve, which represents how different wavelengths interact with the plant's tissues. The absorption curve is like a fingerprint for each element or compound in a plant—it uniquely identifies how different substances interact with light. Just as every person has a unique fingerprint, chlorophyll a, chlorophyll b, and carotenoids each have distinct absorption patterns at specific wavelengths (see diagram). For example, chlorophyll a absorbs the most light in the blue (~430 nm) and red (~665 nm) regions, while chlorophyll b peaks around 455 nm and 640 nm, and carotenoids absorb strongly in the blue range (~450 nm) but reflect yellow and red light—which is why leaves turn yellow in the fall. By analyzing these unique absorption patterns, Nutriscope™ can detect nutrient levels, stress factors, and overall plant health, giving farmers precise, real-time insights.

8.2. How is Nutriscope calibrated?

To ensure accurate measurements, Nutriscope™ underwent a rigorous calibration process using real-world plant samples and advanced machine learning algorithms.

Data Collection: Measuring the Absorption Curve

For each crop type and measurement parameter (e.g., chlorophyll, pH, Brix levels, nutrients), we first capture an absorption curve from a group of leaves—this forms a single sample. The same sample is then analyzed using independent reference methods, such as wet lab chemical analysis or high-precision in-field sensors.

Building the Calibration Model

To create a robust model, we collect a few hundred samples for each crop type. 80% of the samples are used to train the calibration model. The remaining 20% are reserved for validation—a "blind test" to check accuracy.

Machine Learning Calibration

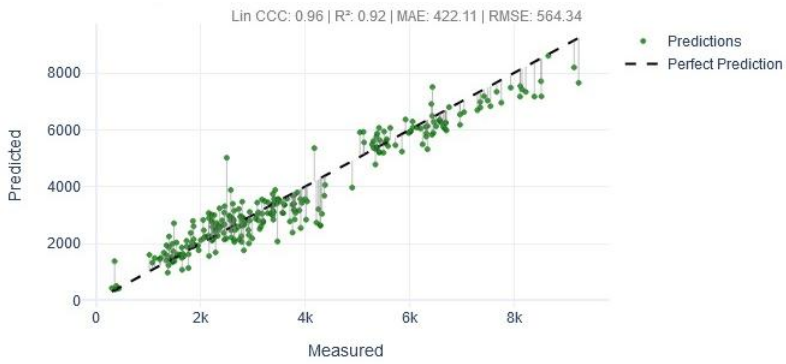
Using machine learning algorithms, Nutriscope™ learns to correlate its absorption curves with real-world lab measurements. The process involves:

- Identifying patterns in the absorption spectra across different crop conditions.
- Mapping spectral data to actual nutrient concentrations, Brix levels, or other parameters.

- Refining the model by minimizing errors between Nutriscope™ predictions and lab results.

Accuracy Validation

Once trained, we test the model using the 20% validation samples that were not part of the training set. Nutriscope™ predicts the values for these samples, and we compare them to their independent lab-measured values (see example on the figure). The difference between Nutriscope™'s predictions and the actual reference values helps us estimate the accuracy and reliability of the device.



Nutriscope™ measurements are based on spectral analysis and machine learning. Accuracy depends on crop type, environmental conditions, and calibration data. Nutriscope™ is continuously improving its calibration models. As we collect more data and refine our machine learning algorithms, we aim to increase accuracy across all parameters. Updates and improvements will be regularly integrated into our system to ensure that users receive the most reliable and actionable insights possible.

⚠ Nutriscope™ is a decision support tool and does not replace professional agronomic judgment. Accuracy levels may vary depending on crop type, environmental conditions, and proper device use. Users should interpret results as indicators not absolute values. Senseen accepts no liability for adverse effects because of its results or advice provided.

9. Customer Support and Resources

9.1. Resources

Access to the online knowledge base, and FAQs: Users can explore our online knowledge base available at www.sensen.io to find detailed guides, troubleshooting tips, and best practices for using Nutriscope™ effectively. The FAQs section offers quick answers to common questions, ensuring that users can resolve issues efficiently and get the most out of their Nutriscope™ device and app.

9.2. Contacting Customer Support

If you encounter any issues during setup, contact Nutriscope™ customer support via our website for assistance at www.senseen.io/support

9.3. Warranty and Repairs

- Nutriscope™ comes with a **1-year limited warranty** covering manufacturing defects.
- If your device needs repair or replacement, contact customer support to initiate a warranty claim.
- For out-of-warranty repairs, inquire about service costs and available options.

10. Glossary of Terms

Term	Definition
Calibration	The process of aligning the Nutriscope™ device to specific measurement standards to ensure accurate data collection.
Knowledge Base	An online repository of resources, including guides, tutorials, troubleshooting articles, and detailed information about Nutriscope™ features and functionalities.
Machine Learning	A subset of artificial intelligence (AI) used in Nutriscope™ to improve scanning accuracy and data analysis by learning from collected data over time.
LLM (Large Language Model)	A type of artificial intelligence model designed to understand and generate human-like text. Used to interpret user inputs and provide intelligent, natural responses.
Mobile App	The Nutriscope™ application installed on a smartphone or tablet, enabling users to interact with the device, access updates, and view analysis results.
Scanning Algorithm	The computational process used by Nutriscope™ to analyze data collected during scans and generate accurate results.

Security Patch	An update to the Nutriscope™ software that addresses vulnerabilities, ensuring secure operation and protecting user data.
Software Update	A release that improves the functionality of the Nutriscope™ mobile app or device by adding new features, fixing bugs, or enhancing compatibility.
User Forum	An online community where Nutriscope™ users can discuss their experiences, share tips, and ask questions to learn from one another.
FAQs (Frequently Asked Questions)	A collection of commonly asked questions and their answers, designed to help users quickly resolve typical issues.
Internet Connectivity	The ability of a device, such as a smartphone or the Nutriscope™, to connect to the internet to access updates, upload data, or download new features.

11. Legal Disclaimers and Compliance Information

Nutriscope™ is designed and manufactured in compliance with applicable industry standards and regulations to ensure safe and effective use. Below is an overview of key legal and compliance information for users:

11.1. ⚠ Disclaimer: Accuracy, Claims, and Usage of Nutriscope™

Nutriscope™ is a decision-support tool designed to provide real-time, data-driven insights into crop health. All measurements, including nutrient levels, pH, Redox potential, Brix, conductivity, and stress indexes, are based on spectral analysis and machine learning calibration models.

Measurement Accuracy & Variability

- Accuracy varies by crop type, environmental conditions, and sample quality.
- Users should interpret results as indicators and trends, rather than absolute values.
- Validation studies are available upon request.

Scientific Basis & Substantiation

- All claims regarding measurement performance are based on internally conducted calibration studies.
- Senseen continuously updates its machine learning models to enhance precision.
- For general methodology, visit https://www.senseen.us/validation.

No Guarantee of Specific Outcomes

- Nutriscope™ is not a replacement for laboratory analysis or professional agronomic judgment.
- Users are encouraged to cross-reference Nutriscope™ readings with additional field observations or lab tests for critical decisions.
- Senseen shall not be liable for crop yield variations, financial losses, or operational decisions made based on Nutriscope™ data.

No Regulatory or Medical Use

- Nutriscope™ is not certified for regulatory compliance, pesticide application, or environmental monitoring.
- Users must verify results through certified laboratory methods when required.

Compliance with Consumer Protection Laws

- This product complies with California Business & Professions Code §§ 17200, 17500, and Civil Code § 1770.
- Any claims related to Nutriscope™'s accuracy and effectiveness are based on scientific research, internal calibration data, and real-world testing.

For support, warranty, and full documentation, visit: www.senseen.io/support.
By using Nutriscope™, the user acknowledges these limitations and responsibilities and agrees to use the product in accordance with best agronomic practices.

11.2. Warranty and Limitations of Liability

Nutriscope™ comes with a limited one-year warranty covering manufacturing defects under normal use conditions. The warranty does not cover misuse, unauthorized modifications, or improper maintenance. Nutriscope™ disclaims all liability for any indirect, incidental, or consequential damages arising from the use of the device or app.

11.3. Regulatory Compliance

Nutriscope™ complies with relevant regulations, including:

- **CE Marking:** Ensures conformity with health, safety, and environmental protection standards for products sold within the European Economic Area (EEA).

- **FCC Compliance:** Certifies that the device meets U.S. Federal Communications Commission standards for electronic emissions.
- **RoHS Directive:** Confirms that Nutriscope™ is free of hazardous substances, in compliance with the Restriction of Hazardous Substances Directive.

11.4. Privacy and Data Protection

Nutriscope™ prioritizes the protection of user data. All personal and crop data collected through the mobile app or device are handled in accordance with our Privacy Policy, which is designed to meet GDPR and other data protection standards. Data is used solely for improving device performance and user experience and is never shared with third parties without explicit user consent.

11.5. User Responsibilities

Users are responsible for ensuring that they operate Nutriscope™ in compliance with local laws and regulations. It is also the user's responsibility to follow proper maintenance and calibration procedures to achieve accurate results.

11.6. Contact Information

For questions or concerns about compliance, warranties, or legal information, please contact our support team:
Email: contact@sensing.green

By using Nutriscope™, users agree to these terms and conditions. Please review the full Terms of Service and Privacy Policy available on our website.

12.Feedback and Updates

We value your input and believe collaboration is key to innovation and improvement. Nutriscope™ provides several ways for users to share feedback, collaborate with others, and contribute to the community:

Providing Feedback
Your insights help us improve Nutriscope™. Users are encouraged to share feedback about the device, app, or overall experience through:

- Support Email: Send detailed suggestions or concerns to contact@sensing.green
- Surveys: Participate in periodic user surveys to guide future updates and features.

Collaboration Opportunities
Currently, Nutriscope™ is calibrated for specific parameters across certain crops, but each additional capability requires further calibration. With a pipeline of calibrations already in progress, we will continue to roll out new capabilities over time. We are actively seeking partners to collaborate on these calibration campaigns to expand Nutriscope™'s reach to more crops and measurements. If you're interested in partnering with us to broaden Nutriscope™'s potential, please contact us to discuss opportunities.
Your feedback and collaboration are instrumental in shaping Nutriscope™ into a tool that meets the evolving needs of its users. We look forward to working together to improve agriculture through innovation.