VALENVERAS
MASTER BOOK

VALENVERAS
Powered by Si-Ware

2025

INDEX

NUTRITION
PLANT HEALTH

VALENVERAS

Powered by Si-Ware

2025

Experience the future of cannabis cultivation with our innovative Nutrition Plant Health

Proper fertilization is crucial for maximizing cannabis yields, promoting plant health, and boosting pest resistance. This plant tissue model provides a framework for optimizing nutrient delivery, leading to:

- **Increased production and potency of medicinal compounds.**
- **Stronger, more resilient plants.**
- **Enhanced natural pest control.**

By implementing this model, cannabis growers can cultivate healthier, more productive plants with higher levels of the desired cannabinoids and terpenes.

Reveal the individual nutritional requirements of each plant

Traditionally, plant nutrition has been a one-size-fits-all approach, applying fertilizers with a broad spectrum of nutrients based on plant type or soil analysis. However, Valenveras revolutionizes this by **revealing the individual nutritional requirements of each plant.** This goes beyond generic needs and delves into the specific needs of every single plant within your crop.

In conclusion, revealing the individual nutritional requirements of each plant with **Valenveras is a game-changer**. It allows for precision farming, optimizing plant growth, maximizing yield, and promoting sustainable agricultural practices.

NUTRITION
PLANT HEALTH

Increased Production

Proper fertilization ensures optimal plant growth, improving the yield and quality of medicinal compounds such as cannabinoids and terpenes. Research indicates that improved fertilization can significantly increase THC and CBD levels in flowers.

Plant Health

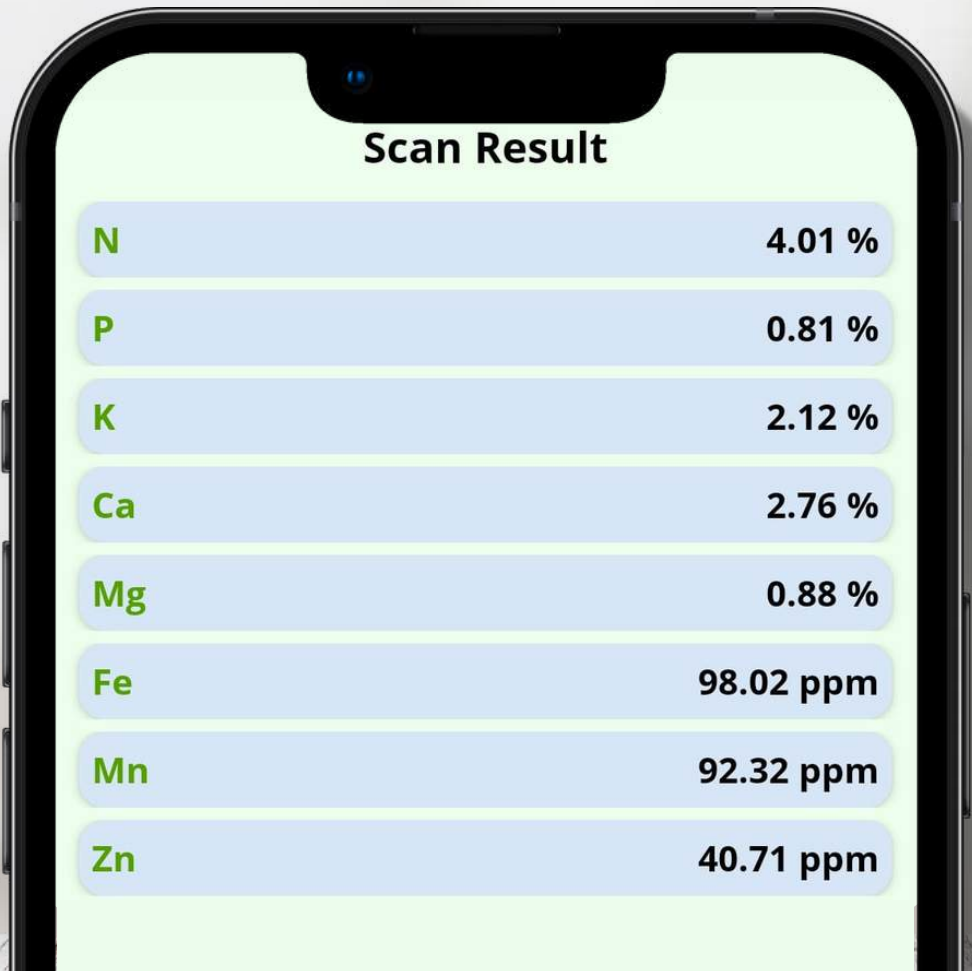
A correct nutrient balance prevents deficiencies that can weaken plants and make them more susceptible to diseases and pests. Balanced fertilization ensures plant vigor and resistance to abiotic factors like water stress and extreme temperatures.

Pest Prevention

Well-nourished plants produce more aromatic compounds (terpenes) that help repel insects and pathogens. Optimal nutrient levels also strengthen the plant's natural defenses.

ICP-MS vs. Valenveras

Factor	ICP-MS	Valenveras
Initial Equipment Cost	High	Low ✓
Operational Costs	High	Low ✓
Cost per Analysis	Medium-High	Low ✓
Analysis Time	Fast	Very Fast ✓
Accuracy and Sensitivity	High	High =
Ease of Use	Medium	Very easy ✓
Size	Big	Very light ✓



Target Values for Growth & Flowering

This information is provided by Sostanza

Target Values for Growth

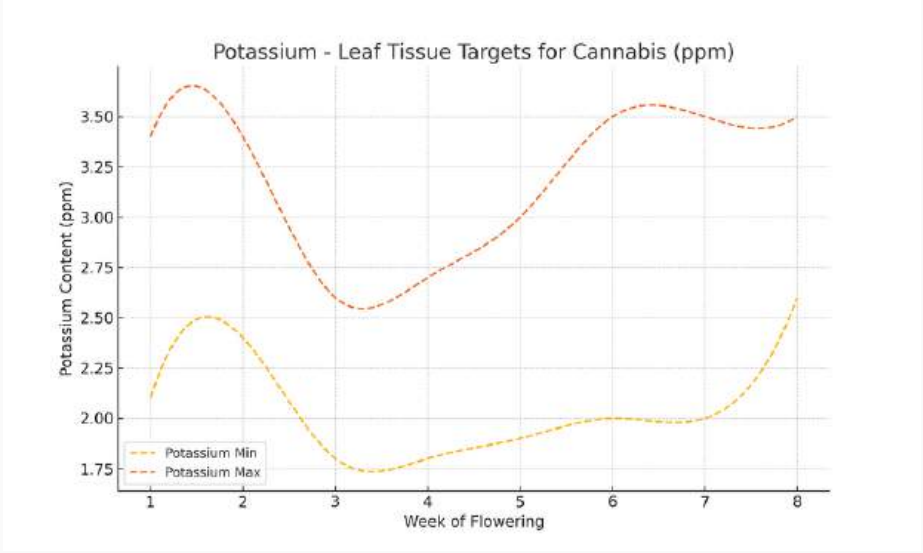
Parameter	Minimum	Maximum	Average
N (%)	2.8	6.0	4.4
P (%)	0.3	0.7	0.5
K (%)	1.5	3.5	2.5
Ca (%)	1.8	6.0	3.9
Mg (%)	0.3	1.5	0.9
Fe (ppm)	80	250	165
Mn (ppm)	80	250	165
Zn (ppm)	20	70	45

Target Values for Flowering

Parameter	Minimum	Maximum	Average
N (%)	3.0	4.3	3.7
P (%)	0.5	0.9	0.7
K (%)	2.1	3.2	2.7
Ca (%)	5.1	7.4	6.2
Mg (%)	0.8	1.2	1.0
Fe (ppm)	89	199	144
Mn (ppm)	113	226	170
Zn (ppm)	40	67	54

Potassium Tissue Ranges

Data represents recommended potassium ranges for weeks 1-8 of flowering



For detailed guidelines and personalized support, contact Sostanza

Agricultural Technical Report CannaTest*

Analysis date: May 24th 2024
Conducted by: Ruben Valenzuela Moreno

Objective: This report aims to provide technical recommendations for correcting fertilization in the cultivation rooms and varieties produced by CannaTest*. Leaf nutrient analyses were carried out to identify deficiencies and excesses of nutrients in the plants.

Nutrient Analysis Results

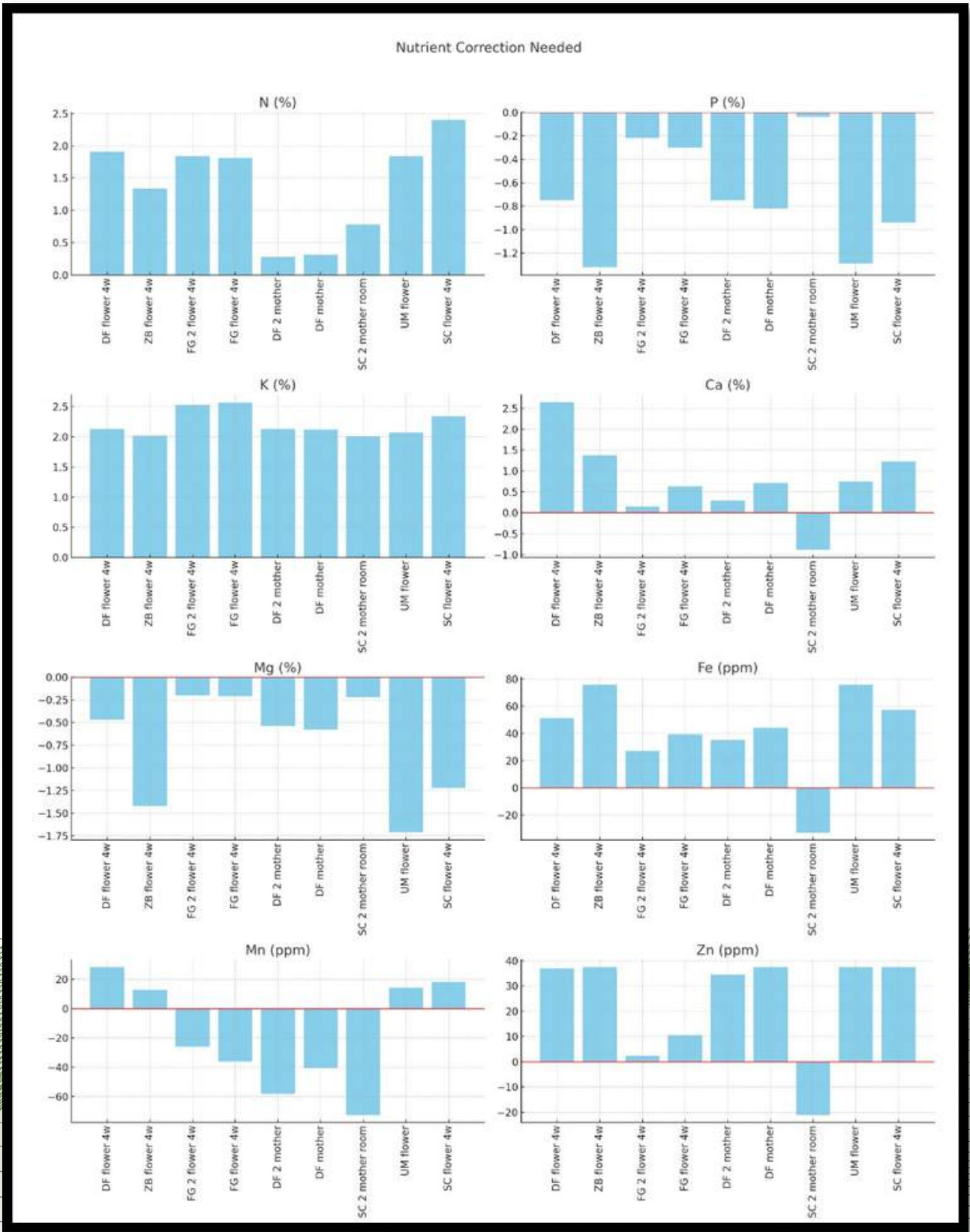
Sample Name	N (%)	P (%)	K (%)	Ca (%)	Mg (%)	Fe (ppm)	Mn (ppm)	Zn (ppm)
DF flower 4w	2.84	1.15	1.87	1.35	1.07	73.98	36.79	0.51
ZB flower 4w	3.41	1.72	1.98	2.62	2.02	49.34	52.25	0.00
FG 2 flower 4w	2.91	0.62	1.47	3.85	0.80	98.02	90.89	35.08
FG 1 flower 4w	2.94	0.70	1.43	3.37	0.81	85.77	101.06	29.95
DF 2 mother	4.47	1.15	1.87	3.71	1.14	90.00	123.17	2.99
DF mother SC	4.44	1.22	1.88	3.29	1.18	81.05	105.58	0.00
2 mother UM	3.97	0.44	1.99	4.89	0.82	157.89	137.50	58.63
flower SC	2.91	1.69	1.93	3.25	2.31	49.17	50.77	0.00
flower 4w	2.35	1.34	1.66	2.77	1.82	67.61	46.97	0.00

Correction Needed:

Sample Name	N (%)	P (%)	K (%)	Ca (%)	Mg (%)	Fe (ppm)	Mn (ppm)	Zn (ppm)
DF flower 4w	1.91	-0.75	2.13	2.65	-0.47	51.02	28.21	36.99
ZB flower 4w	1.34	-1.32	2.02	1.38	-1.42	75.66	12.75	37.50
FG 2 flower 4w	1.84	-0.22	2.53	0.15	-0.20	26.98	-25.89	2.42
FG flower 4w	1.81	-0.30	2.57	0.63	-0.21	39.23	-36.06	7.55
DF 2 mother DF	0.28	-0.75	2.13	0.29	-0.54	35.00	-58.17	34.51
mother SC 2	0.31	-0.82	2.12	0.71	-0.58	43.95	-40.58	37.50
mother UM	0.78	-0.04	2.01	-0.89	-0.22	-32.89	-72.50	-21.13
flower SC	1.84	-1.29	2.07	0.75	-1.71	75.83	14.23	37.50
flower 4w	2.40	-0.94	2.34	1.23	-1.22	57.39	18.03	37.50

*"To protect the identity of the source, this example utilizes data from a real company under the alias CannaTest. The data itself is genuine."

Nutrient Correction Needed



Interpretation of Results and Recommendations

- **Nitrogen (N):** Most samples need an increase in nitrogen levels.
    - Recommendation: Increase the application of nitrogen fertilizers in all samples except DF 2 mother and DF mother where a slight reduction is needed.
- **Phosphorus (P):** All samples indicate a need to decrease phosphorus levels.
    - Recommendation: Reduce the application of phosphorus fertilizers across all samples.
- **Potassium (K):** All samples show a need to increase potassium levels.
    - Recommendation: Increase the application of potassium fertilizers in all samples.
- **Calcium (Ca):** Mixed results with some samples needing an increase and others a decrease.
    - Recommendation: Increase calcium in SC 2 mother room. Decrease calcium in DF flower 4w, FG 2 flower 4w, and FG flower 4w.
- **Magnesium (Mg):** Most samples indicate a need to decrease magnesium levels.
    - Recommendation: Decrease magnesium fertilization in all samples except UM flower and ZB flower 4w where a reduction is needed.
- **Iron (Fe):** Mixed results with some samples needing an increase and others a decrease.
    - Recommendation: Increase iron in DF flower 4w, FG flower 4w, and SC flower 4w. Decrease iron in SC 2 mother room.
- **Manganese (Mn):** Most samples indicate a need to decrease manganese levels.
    - Recommendation: Decrease manganese fertilization in all samples except SC flower 4w where a slight increase is needed.
- **Zinc (Zn):** Mixed results with some samples needing an increase and others a decrease.
    - Recommendation: Increase zinc in DF flower 4w and ZB flower 4w. Decrease zinc in FG 2 flower 4w and SC 2 mother room.

Conclusion

CannaTest should review and adjust its current fertilization plan according to the above recommendations to ensure optimal nutrient levels for all samples. These changes will improve plant health, increase yield, and promote more sustainable and efficient fertilization practices.

VALENVERAS
PORTABLE LAB

VALENVERAS

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Accurate Analysis Of Critical Cannabis Parameters

Precisely determine the composition of crucial parameters along the growing cycle

Nutrients & health
Maintain crop health and take immediate corrective actions.

Water action/activity
Determine the ideal time for processing.

Terpenes
Hone terpene concentrations to differentiate your product.

Potency
Determine the optimum harvesting time for maximum profitability.

Diverse Parameters With A Single Solution

- Zinc PPm
- Manganese PPM
- Iron PPM
- Phosphorus
- Calcium
- Nitrogen
- Potassium
- Magnesium
- CBDa
- CBG
- Delta9 THC
- Moisture
- THCa
- Total CBD
- Total THC
- Water Activity

Unlocking Comprehensive Terpene Profile

B-Myrcene

Terpinolene

A – Humulene

B – Caryophyllene

G – Elemene

B-Myrcene

Limonene

B-Pinene

Eudesma – 3,7 (11)

Linalool

A Comprehensive Analysis of Cannabis Plant Components Across Growth Stages

Leaves

Extract

Flowers

Go Beyond Traditional Testing Methods

Speed of results

Operational efficiency

Frequency of analysis

Increase

Decrease

Logistical costs

Questions on nutrient feeding effectiveness

Risks of wrong or late decisions

Instant Insights For Enhanced Quality

Achieving the perfect balance between quality and cost is paramount in the medical cannabis industry. Valenveras on-site analysis solutions empower breeders, growers, and distributors to optimize their processes, ensuring maximum profitability. By offering real-time insights into critical parameters such as potency, moisture, terpenes, and nutrients, Valenveras significantly enhances the precision of medical cannabis harvest, drying, and distribution timelines. Moreover, it instills greater confidence in the accuracy of product labels.

Common Challenges in The Medical Cannabis Industry

• High cost of analysis
• Time delays associated with sending samples to external labs
. • Inaccurate calendar-based decisions for harvesting, processing, and distribution.

How Valenveras Addresses Them

Handheld solution

Instant and lab-level results

Easy-to-use and ergonomic design

Historic record keeping on Cloud Porta

All-In-One Platform For Your On-Site Analysis Needs

Accurate handheld scanner

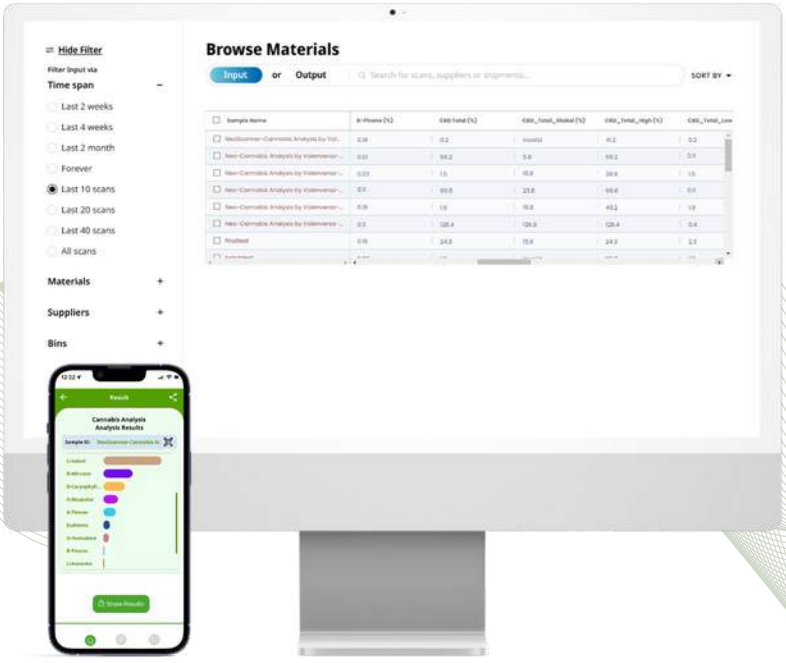
- Field-Ready Accurate NIR spectrometer tailored for cannabis.
- Ergonomic and rugged design.
- Customized accessories for various sample types to easily test plant tissue, emerging flower, dried flower, and soil.

Instant result on mobile app

- Wide selection of critical parameters covering nutrients, potency, terpenes, moisture, and water activity.
- Simultaneous analysis of multiple compounds.
- Results available immediately.

All Your Data In One Place

Amplify insights by aggregating all your data in one Cloud Portal.



- Automatic recording of field results on a Cloud platform
- Advanced analytics for actionable insights
- Centralized access to data across different stages of cultivation

Empowering All Stakeholders In Medical Cannabis Cultivation

- **Timely decisions about quality and compliance**
- **More frequent analysis throughout the growth cycle**
- **Lower operating costs**
- **Accurate and consistent results**

Breeders

- Make timely decisions about plant selection for efficient breeding.
- Ensuring consistent and reliable results in breeding programs.
- Identify plants with the desired chemical profiles and traits for optimized genetics.
- Testing is required at each stage of lifecycle.

Cultivators

- Precisely time harvesting for maximum potency and terpene profiles.
- Optimize nutrient delivery and detect health issues early.
- Monitor drying and determine optimum time for processing.

Distributors & buyers

- Sort products by grades and conduct pre-certification testing.
- Label verification for potency and moisture content.
- Build a reputation for product consistency.

Putting It All Together

Valenveras's on-site analysis solutions transform medical cannabis cultivation by providing real-time insights for optimizing quality and cost. With a field-ready handheld scanner offering instant, lab-level results and a Cloud portal for centralized data access, Valenveras simplifies the complex process of cannabis analysis. It accurately assesses critical parameters such as potency, moisture, terpenes, and nutrients while increasing operational efficiency, analysis frequency, and result speed, all while reducing logistical costs and errors in decision-making. Valenvera brings the lab to where decisions are made, benefiting cultivators, testing labs, and dispensaries, enhancing efficiency and boosting margin.

Instant Results
Make timely decisions for maximum potency.

Lab-Level Accuracy
Achieve precise analysis without delays.

Increased Testing Frequency
Enhance your cultivation process.

New Revenue Streams
Develop strains that meet specific industrial needs

VALENVERAS
TECHNICAL SPECIFICATIONS

VALENVERAS

Powered by Si-Ware

2025

Unlock the Power of NIR Analysis Anywhere, Anytime

In a world where data-driven decisions are crucial, Valenveras Portable Lab and it's accessories emerge as the ultimate tool for professionals seeking rapid material analysis solutions outside the confines of a laboratory to make informed decisions swiftly and accurately. Here's why Valenveras Portable Lab is a game-changer in material analysis:

Key Features That Set Valenveras Apart

Precision & Accuracy Widest spectral coverage in NIR (from 1,350 to 2,500 nm) providing accurate performance for various materials and parameters.

Ergonomic Handheld Design Designed for one-handed operation, our scanner is comfortable to use and requires minimum training.

Rugged Build Valenveras Portable Lab is engineered to thrive in uncontrolled conditions, whether in a lab, on the factory floor, or out in the field.

Battery Operated With rechargeable and replaceable batteries, you can count on long-lasting performance wherever you go.

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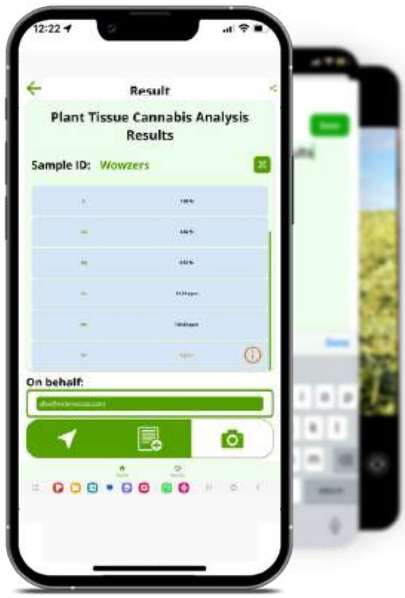
Get Instant Results On Your Mobile App

Intuitive mobile app provides step-by-step guidance through the process.

1. Select material
2. Take measurement
3. Get results instantly, even when offline



GET IT ON Google Play | Download on the App Store | Available on Windows

It's All in the Cloud: Hassle-Free Data Lifecycle Management

Amplify insights by aggregating all your data in one Cloud Portal.

- AUTO-SYNCED RESULTS FROM MOBILE APP
- ADVANCED ANALYTICS & REPORTS
- CENTRALIZED DATA & DEVICES MANAGEMENT

General Specifications

Dimensions	7x 3.6x 2.5 inch (178x 91x 62 mm)
Weight	2.2 lbs. (1 kg)
Operation Temperature	23 : 104 °F (-5 : 40 °C)
Ingress Protection Rating	IP65
Battery Type	Two rechargeable 18650 batteries, user replaceable
Operating Battery Life (2 Second Scans)	800 Scans
Battery Charge Time (IA Charging Current)	6 hours on fast charging to reach 100%
Bulb Lifetime	> 10.000 hrs.
Wireless Connectivity	Bluetooth V4.2 BLE
Charging Port	USB-C
Software	Operation via NeoSpectra mobile applications for spectral data collection, and material analysis

Technical Specifications

Wavelength Range SNR>170:1	1,350 - 2,500 nm , 7,400 — 4,000 cm^{-1})
Resolution at λ=1,550 nm, FWHM criterion	16nm (66.6 cm^{-1})
Typical SNR' (rms) Scan time = 2s, λ = 2,350 nm	2,000:1
Sample coverage (Diameter of Collected Light Beam)	~ 0.4 inch (~10 mm)

Cannabinoid Specifications

(Flower)

Cannabinoid models have been divided into regions to acquire the best results on the lower concentrations. A hierarchical model is used for THC and CBD.

		Low Concentration 0-3%				High Concentration 3-29%			
	# samples	RMSECV	R2cv	RMSEP	R2p	RMSECV	R2cv	RMSEP	R2p
CBD Total (v5)	898	0.19	0.80	0.16	0.91	1.6	0.89	1.7	0.91
THC Total (v6)	1099	0.15	0.85	0.10	0.93	1.8	0.91	1.2	0.98
CBG Total (v5)	898	0.15	0.71	0.11	0.72				
Total Terpenes	659	0.20	0.70	0.30	0.65				
THC acid (v6)	1099	0.16	0.84	0.11	0.91	2.2	0.9	2.2	0.89
CBD acid (v5)	898	0.20	0.79	0.18	0.90	1.65	0.88	1.3	0.97

(Solid Extract)

	Low range				High Range			
	Min	Max	R2CV	RMECV	Min	Max	R2CV	RMECV
THC	0	1	0.75	0.15	17	70.1	0.98	2
CBD	0	1.3	0.71	0.2	4	99.9	0.99	2.8
TAC_Total Cannabinoids	1	99.9	0.99	2.7				

Water Activity

(Flower)

	# samples	Min	Max	RMSECV	R2cv
aW	355	0.42	0.65	0.02	0.82
Moisture	355	4.3	11.8	0.91	0.75

How It Works?

Valenveras Portable Lab operates on the same principles as a laboratory FT-NIR spectrometer but in a compact, portable form thanks to our patented.

It uses Near Infrared (NIR) light, which is invisible to the human eye, to analyze materials based on their unique spectral response. This provides invaluable insights into a material's chemical and nutritional composition, allowing for quick and informed decision-making.

VALENVERAS
WHITEPAPER
CANNABINOIDS, TERPENES & WATER

VALENVERAS
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2025

Introduction

In the fast-growing cannabis industry, breeders and growers face increasing pressure to produce crops that meet market standards for potency, terpene profiles, and moisture levels. Traditional laboratory testing can be costly and slow, delaying important decisions in cultivation. Near-infrared (NIR) has shown the potential to be used to predict cannabinoids, terpenes, and moisture in cured and dried samples. NIR is a part of the electromagnetic region that takes advantage of the light-matter interaction to obtain the physic-chemical information of the matter. Traditionally, NIR instruments have been limited in their use in the lab or a controlled environment.

The Valenveras Portable Lab utilizes NeoSpectra portable NIR technology by Si-Ware Systems to offer a real-time, non-destructive solution for analyzing cannabis flowers on-site. This whitepaper outlines how Valenveras utilizes this technology to measure key quality parameters—potency, terpenes, moisture, and water activity—and discusses the portable lab system's benefits for cannabis growers and breeders. Valenveras Portable Lab's unique advantages include its broad NIR spectral range and integration with a cloud-based platform, which makes it a comprehensive tool for breeders and growers. The instrument allows for quick decisions, improved harvest timing, better product quality, and lower testing costs, leading to optimized yields and more efficient operations.

Portable NIR Technology Platform

The Valenveras portable NIR spectrometer, NeoSpectra, provides an extended spectral range from 1,350 to 2,550 nm, enabling detailed chemical profiling, especially for small molecular changes. The instrument's resolution is 16 cm^{-1} (2.5 to 8.7 nm – depending on the wavelength range) and the minimum signal-to-noise is 2000. This allows for accurate measurement of cannabinoids (e.g., THC, CBD), terpenes, moisture content, and water activity—critical metrics for determining harvest timing, curing processes, and product quality (figure 1).

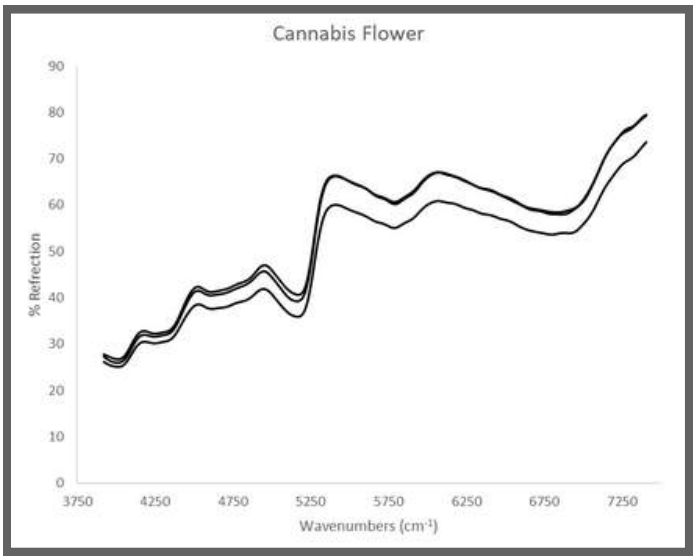


Figure 1. Typical NIR spectra of ground cannabis flower in % reflection and wavenumbers (cm^{-1})

The Valenveras Portable Lab system integrates with a cloud-based platform, making data management seamless. The cloud solution allows breeders and growers to store, access, and analyze their data from any location, centralizing all measurements, reports, and analytical models in one place. This ensures that model updates and new data are easily managed, allowing users to continuously improve their business analytics. Portability is one of its key advantages. The lightweight design enables on-site, real-time testing in fields or greenhouses, significantly reducing the need for external labs and offering immediate feedback. This flexibility ensures that growers can test at different stages of the cultivation process, from early growth through harvest and curing.

Key Cannabis Quality Parameters Measured

Cannabis quality parameters, including potency, terpenes, moisture, and water activity are essential to be controlled for the growers, breeders, and distributors to optimize the crop, production, and batches.

In the laboratory, cannabinoid concentrations of the flowers were obtained using High-Pressure Liquid Chromatography (HPLC) with an ultraviolet and visible detector. In summary, 200 milligrams of the dry and ground flower is placed in 4 mL of ethanol for 20 minutes and mixed every 5 minutes. After that, the sample is filtered through a 0.22 µm syringe tip filter into an HPLC vial and injected into the HPLC (Certified method from modified AOAC Official Method 2018.11 for Quantification of Cannabinoids in Plant Materials, Concentrates, and Oils – ENAC Certification). For terpenes analysis, samples were prepared by extraction of the plant material with ethyl acetate containing n-tridecane solution (100 µg/mL) as the internal standard. The liquid is filtered through a 0.22 µm syringe tip filter into an HPLC vial and injected into the GC. For moisture, >1 g of ground samples were analyzed with a loss-on-drying 100°C oven balance at ambient pressure, while water activity utilized a tunable diode laser (TDL)-based chilled-mirror dew point hygrometer chamber.

Potency is one of the most desired parameters to know in a cannabis flower. The cannabinoids can have two forms the acid form and the neutral form. Each one has different implications for the quality of the flower and its management. Terpenes, give cannabis its aroma and influence its medicinal properties. Terpenes are complex compounds that during the curing process are lost due to their volatility. Water activity is an important measure of how much free water is available for microbial growth. Proper moisture control is crucial for preventing mold and ensuring product longevity. Monitoring moisture levels during the drying and curing process helps growers preserve product quality and avoid spoilage or microbial contamination, which is critical for meeting regulatory standards and consumer safety requirements. Proper water activity management helps ensure the cannabis is safe for long-term storage and consumption, further protecting the final product from spoilage

Near-Infrared Model Development

To create accurate models for Valenveras' cannabis analysis, a large, diverse set of samples is collected and analyzed using NeoSpectra's NIR spectrometer system. The collected spectra are correlated with reference values from traditional lab methods. An ISO-accredited and certified laboratory was used to obtain the reference values to develop the Valenveras models using the NIR spectra.

To ensure the reduction of the unit-to-unit variability spectra of the samples, the spectra are generalized by using a patented algorithm (patent pending) that created synthetic scanners based on real scanners. These synthetic scanners are used to include the small difference between devices due to the production variability. This methodology ensures the seamless transfer of the models between different devices.

Once the spectra are linked with these lab-validated values, multivariate techniques like Partial Least Squares Regression (PLSR) are used to build calibration models. The Valenveras lab platform has a unique feature that allows for hierarchical models, providing the versatility of modeling that permits obtaining the lowest error of predictions in the lower and higher ranges (figure 2). Moreover, the technology can integrate semi-quantitative models that can be used for profiling individual terpenes.

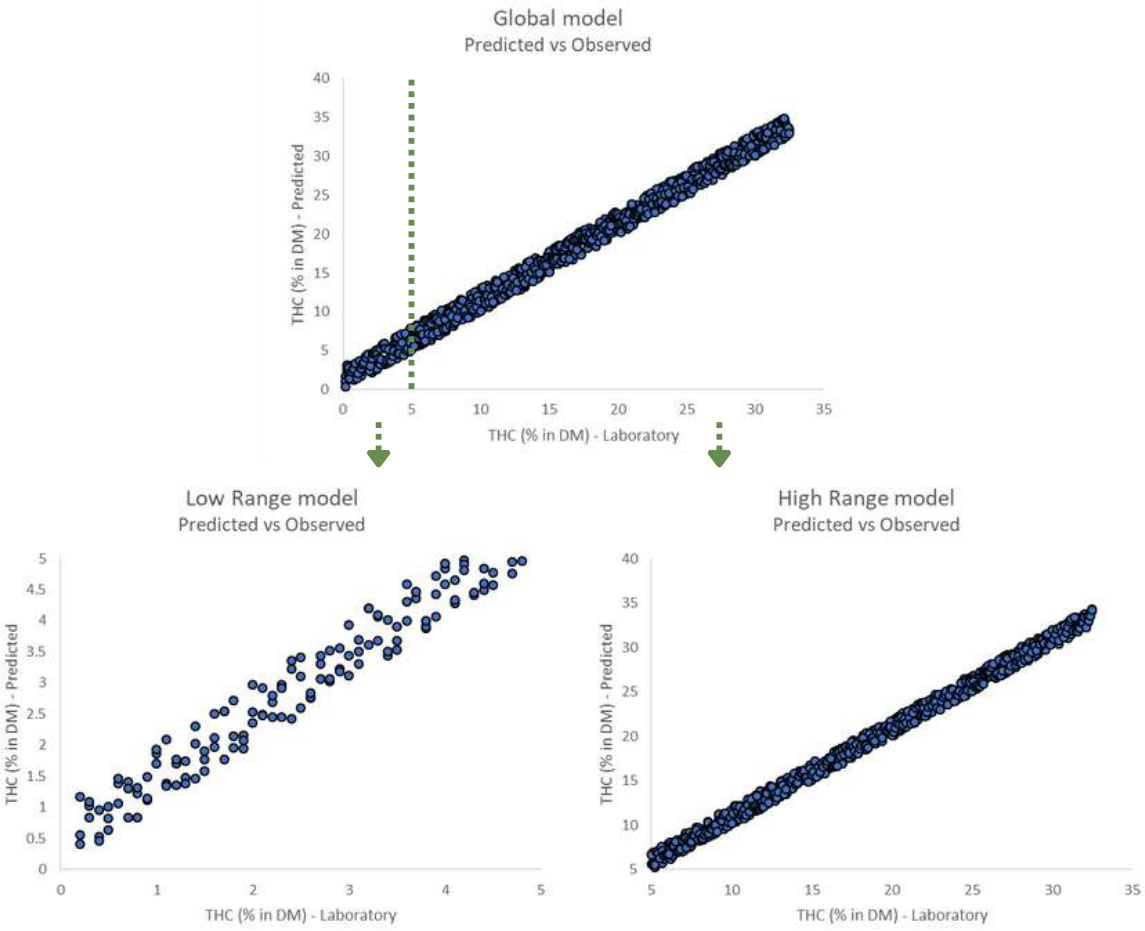


Figure 2. Hierarchical model based on three PLS regressions allows maximization of accuracy for respective measurement ranges

After calibration, the models are validated with new sets of samples to ensure accuracy before being deployed on the Valenveras Portable Lab system. The system's cloud platform allows for easy model deployment and updates, ensuring users have access to the most accurate, up-to-date models without the need for extensive retraining.

The instrument provides a semi-quantitative analysis of terpene ratios within a sample, helping growers identify and select strains with desirable profiles. The system enables breeders to track terpene trends over time, allowing for the refinement of strain-specific characteristics that are important for consumer preferences and product differentiation.

Table 1. Summary of the models for the parameters of interest.

		Low Concentration 0-3%				High Concentration 3-32%			
	# samples	RMSECV	R^2_{cv}	RMSEP	R^2_p	RMSECV	R^2_{cv}	RMSEP	R^2_p
CBD Total (v5)	898	0.19	0.80	0.16	0.91	1.6	0.89	1.7	0.91
THC Total (v7)	1099	0.15	0.85	0.10	0.93	1.9	0.91	1.2	0.98
CBG Total (v5)	898	0.15	0.71	0.11	0.72				
Total Terpenes	659	0.20	0.70	0.30	0.65				
THC acid (v6)	1099	0.16	0.84	0.11	0.91	2.2	0.9	2.2	0.89
CBD acid (v5)	898	0.20	0.79	0.18	0.90	1.6	0.88	1.3	0.97

		Min	Max	RMSECV	R^2_{cv}
a_w	355	0.42	0.65	0.02	0.82
Moisture	355	4.3	11.8	0.91	0.75

Legend: RMSECV: Root Mean Square Error of Cross-Validation; RMSEP: Root Mean Square Error of Prediction; R^2_{cv}: Determination Coefficient of Cross-Validation; R^2_p: Determination Coefficient of Prediction; a_w: Water Activity; (vX): Model Version

Sample Handling and Preparation

For accurate readings, cannabis samples should be dried and ground before being analyzed with the Valenveras Portable Lab. This preparation ensures that the samples are uniformly scanned, leading to more precise and consistent results. Proper sample preparation also helps ensure that the full chemical composition of the cannabis is captured, allowing for accurate predictions of potency, moisture, and terpene content.

Third-party validation

Several external labs have validated the performance of the Valenveras Portable Lab for several parameters. In summary, these external labs found accuracies (± in absolute %) of their parameters of interest as follows:

Table. 2. Third-party validation for the parameters of interest (± absolute %)

	Total Terpenes	Moisture	THCa	Total THC	Total CBD	CBG
Lab. A		0.26		1.21	0.47 (**)	
Lab. B	0.25			1.2	0.52 (**)	0.28
Lab. C				0.7		
Lab. D				1.1		
Lab. E				1.1		
Lab. F	0.18			1.4		
Lab. G				0.17 (*)	1.4	
Lab. H			0.89	0.86		

(*) Low range THC (**) Low range CBD

The table shows that the accuracies for the third-party lab validations are consistent with the predicted model performance in Table 1.

Discussion

The Valenveras Portable Lab system offers breeders and growers significant advantages by providing real-time, on-site analysis of key cannabis quality parameters such as potency, terpenes, moisture, and water activity. This enables more informed decision-making throughout the cultivation process, allowing for timely adjustments in irrigation, nutrient management, and harvest timing.

The system reduces the need for expensive, time-consuming lab testing, saving both time and costs. Moreover, allows the users to analyze the batches in a higher frequency providing more control of the batches and better compliance with the different requirements.

Additionally, the Portable Lab's cloud-based platform streamlines data management and model deployment, ensuring that growers have access to the most up-to-date information for optimizing crop quality. This combination of fast, accurate analysis and cloud integration helps breeders and growers enhance strain development, ensure product consistency, and meet market demands more effectively.

Conclusion

The Valenveras Portable Lab, built on the Si-Ware Systems NeoSpectra platform, is a powerful tool for cannabis breeders and growers, offering a fast, non-destructive method for analyzing key quality parameters like potency, terpenes, moisture, and water activity. With its broad NIR range, portability, and cloud-based integration, the portable lab provides an efficient, cost-effective solution for real-time cannabis analysis. By reducing reliance on external labs and speeding up the decision-making process, Valenveras helps breeders and growers optimize their operations, improve product quality, and meet regulatory requirements more easily. As the cannabis industry continues to expand, advanced technologies like the Valenveras Portable Lab will play an increasingly important role in ensuring the success of breeders and growers.

Acknowledgement

This work was not able to be done with the help of the CTAEX (https://ctaex.com/en/), especially Montse Gomez (Analytical Manager) and Maria Perez Rey (R&D Manager).

3rd-PARTY LAB TESTS
VALIDATIONS
vs VALENVERAS

VALENVERAS

Powered by Si-Ware

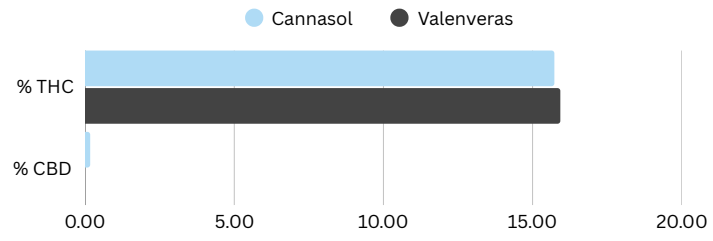
2025

3rd-Party Lab Tests Validation vs Valenveras

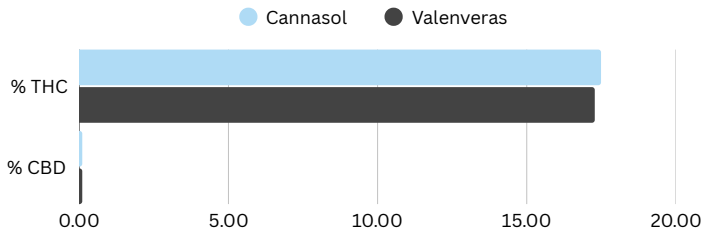
Laboratory	**Cannasol**
Date	21st of January, 2025
Sample	**G01F2435A1, G02P2441A3**
Sample Producer	**Plantis Farm**
Sample Type	Dry Flower

	G01F2435A1		G02P2441A3	
	Cannasol	**Valenveras**	**Cannasol**	**Valenveras**
% THC	**15.73**	**15.93**	**17.49**	**17.28**
% CBD	**0.17**	**0**	**0.1**	**0.1**

G01F2435A1



G02P2441A3



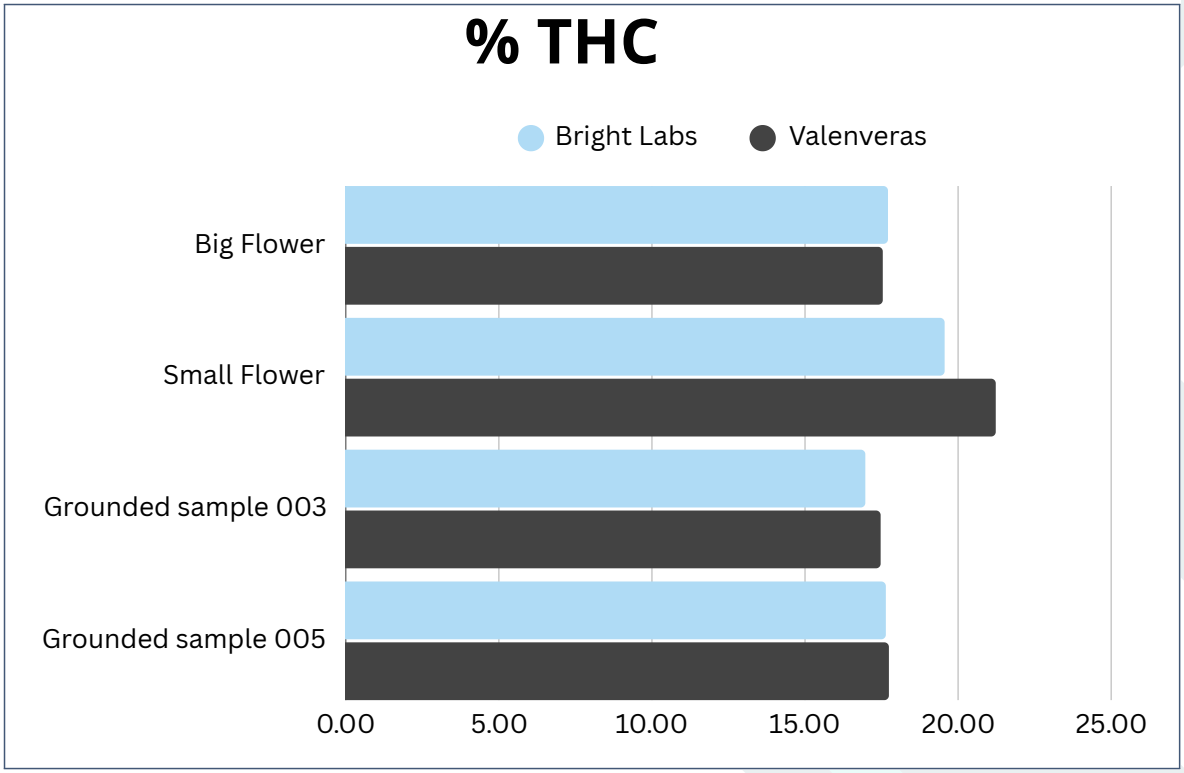
Testing is conducted in an ISO 17025-certified lab facility.

VALENVERAS Powered by Si-Ware

3rd-Party Lab Tests Validation vs Valenveras

Laboratory	**Bright Labs**
Date	14th of October, 2024.
Sample	**Big Flower, Small Flower, Grounded sample 003, Grounded sample 005**
Sample Producer	**F1 Seed Tech**
Sample type	Dry Flower, grounded flower

% THC	Big Flower	Small Flower	Grounded sample 003	Grounded sample 005
Bright Labs	**17,71 %**	**19,56 %**	**16,97 %**	**17,64 %**
Valenveras	**17,54 %**	**21,23 %**	**17,47 %**	**17,74 %**

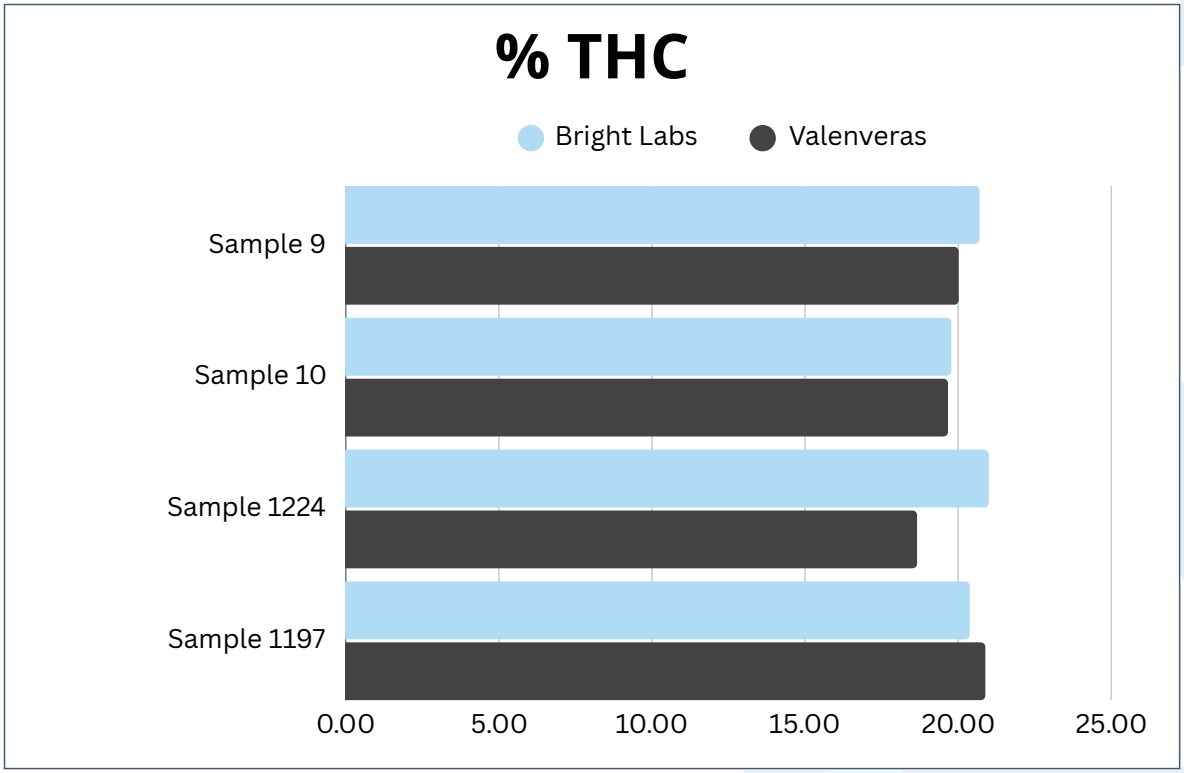


Testing is conducted in an ISO 17025-certified lab facility.

3rd-Party Lab Tests Validation vs Valenveras

Laboratory	**Bright Labs**
Date	14th of October, 2024.
Sample	**9 - 1- 1224 - 1997**
Sample Producer	**F1 Seed Tech**
Sample type	Dry Flower

% THC	9	10	1224	1197
Bright Labs	**20.70**	**19.78**	**21.00**	**20.38**
Valenveras	**20.02**	**19.67**	**18.66**	**20.89**



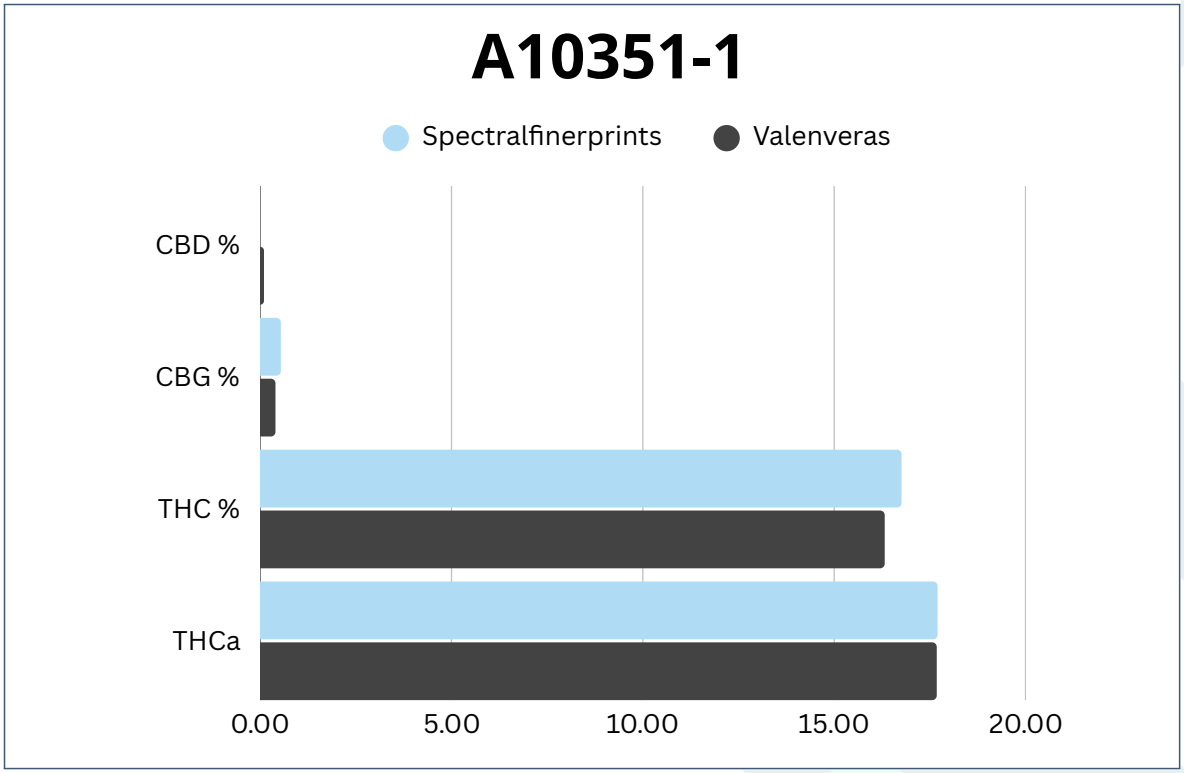
Testing is conducted in an ISO 17025-certified lab facility.

VALENVERAS Powered by Si-Ware

3rd-Party Lab Tests Validation vs Valenveras

Laboratory	**Spectral Fingerprints**
Date	14th of November, 2024.
Sample	**A10351-1**
Sample Producer	**Valenveras**
Sample type	Dry Flower

% THC	CBD %	CBG %	THC %	THCa
HPLC	**0.05**	**0.54**	**16.76**	**17.70**
Valenveras	**0.10**	**0.40**	**16.32**	**17.68**

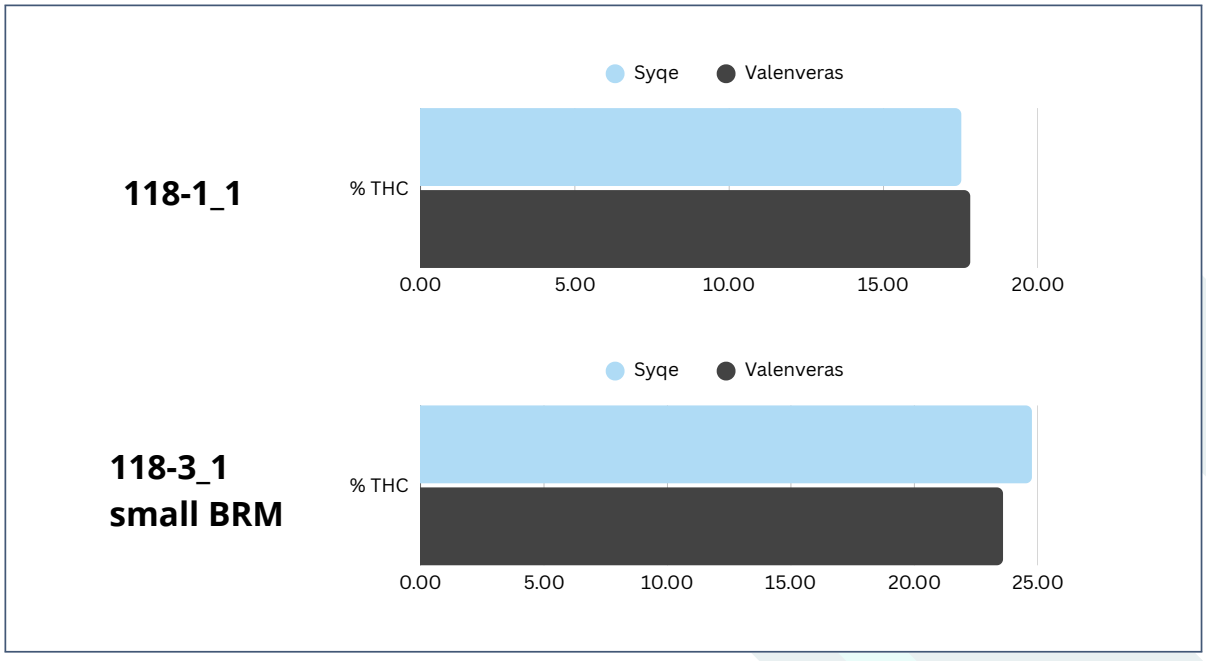


Testing is conducted in an ISO 17025-certified lab facility.

3rd-Party Lab Tests Validation vs Valenveras

Laboratory	**Syqe Lab**
Date	3rd of September, 2024
Sample	**118-1_1** **118-3_1 small BRM**
Sample Producer	**Bedrocan**
Sample type	Dry Flower

	118-1_1		118-3_1 small BRM	
	Syqe	**Valenveras**	**Syqe**	**Valenveras**
% THCA	**17.52**	**17.81**	**24.76**	**23.59**



Testing is conducted in an ISO 17025-certified lab facility.

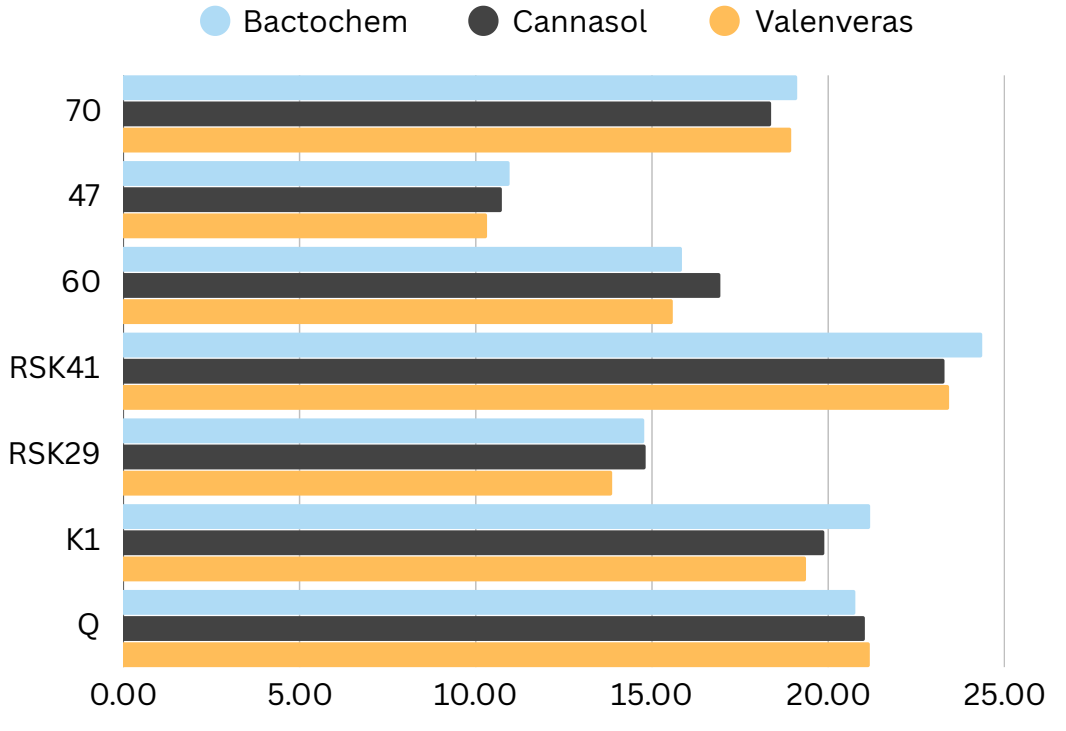
External Validations

VALENVERAS
Powered by Si-Ware

3rd-Party Lab Tests Validation vs Valenveras

Laboratories	**BACTOCHEM & CANNASOL**
Date	January 19, 2025
Sample	**70, 47, 60, RSK41, RSK29, K1, Q**
Sample producer	**PLANTECK**
Sample type	Dry Flower

	BACTOCHEM THC %	CANNASOL THC %	VALENVERAS THC %
70	**19.12 %**	**18.38 %**	**18.95 %**
47	**10.96 %**	**10.74 %**	**10.32 %**
60	**15.85 %**	**16.94 %**	**15.59 %**
RSK41	**24.37 %**	**23.30 %**	**23.43 %**
RSK29	**14.78 %**	**14.82 %**	**13.87 %**
K1	**21.19 %**	**19.89 %**	**19.37 %**
Q	**20.77 %**	**21.04 %**	**21.18 %**



Testing is conducted in an ISO 17025-certified lab facility.

VALENVERAS
CERTIFICATES

VALENVERAS

Powered by Si-Ware

2025

INDEX

SI-WARE SYSTEMS ISO9001 CERTIFICATE

ISO 9001 is an internationally recognized standard for Quality Management Systems (QMS). It outlines criteria for a QMS and is based on principles like customer focus, leadership, process approach, and continual improvement. Certification demonstrates a commitment to providing quality products and services, enhancing customer satisfaction, and continuous improvement.

EURO CERT

Certificate Number
00.12.1041

Date of Initial Validity of the Certificate from
23/01/2014
Date of the Validity of the current Certificate from
06/02/2023

The Certificate is valid until
05/02/2026

CERTIFICATE

EUROCERT S.A. certifies that the company

Si-Ware Systems

3, Khaled Ibn Al-Waleed Street, Heliopolis,Cairo, Egypt

implements a Quality Management System
according to the Standard:

EN ISO 9001:2015

for the following Scope of Certification:

SI-WARE SYSTEMS IS A FABLESS SEMICONDUCTOR COMPANY DESIGNING, DEVELOPING, DISTRIBUTING & SUPPORTING FT-NIR END-TO-END REAL TIME MATERIAL SENSING SPECTROSCOPY SOLUTIONS.

On behalf of EUROCERT S.A.,
Sifonios George
Director of International Markets

Lack of fulfillment of the conditions set out in the contract No.06.000058.23, makes this Certificate invalid.
The validity of this Certificate is subject to annual surveillance.
Check the validity of the Certificate with the QR code at right.

IAF

ESYD
MS Certification Cert.No.:3

EUROCERT S.A. 89 Chlois & Lykovriseos str., 144 52, Metamorphosi - Greece
T +30 210 62.52.495, +30 210 62.53.927, **F** +30 210 62.03.018, **M** eurocert@otenet.gr

CERTIFICATE OF EQUIPMENT AUTHORIZATION

This device is approved by ANATEL with the certificate of Equipment Authorization 04780-23-15488.

Federative Republic of Brazil
Telecommunications National Agency

ANATEL

Certificate of Equipment Authorization

(Not Transferable)

N° **04780-23-15488**

Expires: **Indeterminada**

Date of Certificate: **15/03/2023**

Applicant:
CNPJ: 10.561.430/0001-36
NEW PATHS REPRESENTAÇÃO COMERCIAL LTDA

Manufacturer:
SI-WARE SYSTEMS
3, KHALED IBN AL-WALEED ST., SHERATON, HELIOPOLIS
N°
11361
EGITO

This document approves, in accordance with the Telecommunication Rules and Regulations, the Certificate of Conformity number Versys 4063, issued by **Associação Versys de Tecnologia**. This approval is issued on behalf of the applicant here identified and is valid only for the product described below for use under the Anatels Rules and Regulations.

Type - Category:
Transceptor de Radiação Restrita - II

Model - Comercial Name (s)
NEO1001 - (NeoSpectra-Scanner-10mm)

Basic technical characteristics:

Tipo de Modulação	Faixa de Frequências Tx (MHz)	Tecnologias	Potência Máxima de Saída (W)	Designação de Emissões
GFSK	2.400,0 a 2.483,5	SEQÜÊNCIA DIRETA	0,00014	660KX9D

-Ensaio de SAR não aplicável: o equipamento possui potência medida emitida em um tempo médio de 6 (seis) minutos menor que 20 mW e o pico de potência emitida é menor que 20 W.
-O produto possui antena integrada.

Comments

Na instalação do produto devem ser observadas as condições de uso conforme estabelecido no Regulamento sobre Equipamentos de Radiocomunicação de Radiação Restrita.

Constitutes an obligation of the manufacturer or supplier of the product in Brazil to identify all approved products with Anatel's mark before its distribution to the market, as well as observe and maintain the technical characteristics which motivated the original certification.

The information in this Approval Certificate can be confirmed in the Certification and Approval Management System - SCH, available on Anatel's website. (www.anatel.gov.br).

Davison Gonzaga da Silva
Gerente de Certificação e Numeração

GENERATION OF EQUIPMENT TYPE APPROVAL

This device has an Equipment Type Approval (ETA) from the Government of India, issued under O.M. No. ETA-WPC

सत्यमेव जयते

Government of India
Ministry of Communications
Department of Telecommunications
WPC Wing
Sanchar Bhawan, New Delhi-110001.

[Generation of Equipment Type Approval (ETA) through self-declaration issued under O.M. No. ETA-WPC /Policy/2018-19 dated 26 February, 2019].

THIS ETA IS ISSUED FOR A SINGLE MODEL WITH MODEL NAME NEO1001

Registration No: ETA-SD-20230201614 Date: 21-02-2023

I). Details of Applicant and Parameters of Equipment:

1.	Name & Address of the first Applicant. (Indian Manufacturer/ Authorised Indian representative for foreign manufacturer)	PAVONE TECHNOLOGIES, WZ-256 E/1, SECOND FLOOR, INDERPURI, Central Delhi,DELHI,110012
2.	Equipment category	Handheld Spectral Sensing Scanner
3.	Make	Si-Ware Systems,Egypt
4.	Model	NEO1001
5.	Frequency range(s) of Equipment	1. 2402-2480 MHz
6.	Max output power/Field strength/PSD	1. E.I.R.P. (dBm). 10.95

GENERATION OF EQUIPMENT TYPE APPROVAL

This device has an Equipment Type Approval (ETA) from the Government of India, issued under O.M. No. ETA-WPC

7.	Applicable Gazette Notification(s)	1. 45 (E) Dated 28-01-2005	
8.	RF Test Report details:-		
	Name&Address /Country of accredited laboratory issuing the RF test report	Accreditation Certificate Reference/Number	Test Report No. and Date
	CERPASS TECHNOLOGY CORPORATION TEST LABORATORY & No.10, Ln.2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.)	TAF 1439	22060122-TRCE02 & 12-12-2022

II). Terms and Conditions

(i). This certificate will not be valid in case any change in the above parameters and not conforming to the Gazette Notification mentioned in sl.no 7 above.
(ii). Use of such equipment has been exempted from licensing requirement vide Gazette Notification mentioned in sl. no. 7, on Non-interference,Non-protectionand sharing (non-exclusive) basis.
(iii). Use of such equipment in case not conforming to above notification will require a specific wireless operating license, as applicable from this Ministry.
(iv). Field units of WPC Wing reserve the right for sample check/audit carried out for the purpose of RF analysis/spectrum monitoring in view to avoid interference to other wireless users and ensure compliance of technical parameters mentioned in sl no. 5,6&7.
(v). This certificate is valid only for equipment which are exempted from import licensing requirements as per the Import Policy of DGFT and for import of such device, a self-declaration based, system generated (Saralsanchar) Import undertaking/ permission is required.
(vi). The applicant is liable for prosecution under Indian Law in case of any wrong declaration/ submission of ingenuine RF test report(s) for issue of ETA through Self-Declaration.

Note:
1. Once ETA through self-declaration is generated for a model, subsequently it may be utilized by other person(s) for import/usage purpose in India.

2. The importers of above model shall comply with other import related requirements, if any, with Customs.

This is Self-generated certificate. Hence, no signature is required. It may be downloaded/verified from the website https://saralsanchar.gov.in.

FCC SUPLLIER'S DECLARATION OF CONFORMITY

This device complies with Part15 of the FCC Rules. Operation is subject to the following two conditions: (1)This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.Supplier's Declaration of Conformity 47 CFR ? 2.1077Compliance Information Unique Identifier: NeoSpectraScanner-10mmResponsible Party ? U.S. Contact Information: Si-ware Inc., 101 Jefferson Drive, 1st. Floor, Menlo Park, CA 94025

Supplier's Declaration of Conformity

47 CFR § 2.1077 Compliance Information

Unique Identifier: NEO1001

Responsible Party – **U.S. Contact Information**

Si-Ware Systems, Inc.

101 Jefferson Drive, 1st. Floor,

Menlo Park, CA 94025

Nevine.mounib@si-ware.com

FCC Compliance Statement

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, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Date: 12/27/2022

Name: Nevine Mounib

Function: Operations Manager

Signature: N. Mounib

RADIO EQUIPMENT TYPE DIRECTIVE 2014/53/EU7

Hereby, Si-Ware Systems, declares that the radio equipment type NeoSpectra Scanner-10 mm, is incompliance with Directive 2014/53/EU

NeoSpectra™ by Si-Ware

EU Declaration of Conformity

Hereby we, the undersigned:

Manufacturer:	Si-ware Systems
Address; city:	3, Khaled Ibn Al-Waleed St., Sheraton, Heliopolis, Cairo
Country:	Egypt
Telephone number:	+20 222 68 47 04
Authorized representative in Europe:	SI-WARE SYSTEMS
Address; city:	16 rue portalis, 75008, Paris
Country:	France
Contact:	Bassam.saadany@si-ware.com

Declare that this DoC is issued under our sole responsibility and that this product is:

Product description:	Handheld Spectral sensing scanner
Type Number:	NEO1001
Trademark:	NeoSpectra

Object of the declaration:

The object is in conformity with the relevant Union harmonization legislation:

☒	*Radio Equipment Directive – 2014/53/EU*			
☒	**Article 3.1(a)**	☒	**Article 3.2**	
	EN 62368-1:2014+A11:2017		EN 300 328 v.2.2.2. (2019-7)	
	EN 62311:2008			
☒	**Article 3.1(b)**		**EU Type examination:**	
	EN 301 489-1 V.2.2.3 (2019-11)		Notified Body:	Phoenix Testlab GmbH
	EN 301 489-17 V.3.2.2 (2019-12)		Notified Body Number:	0700
			Type examination Number:	22-211368 - 22-221368

☐	*Ecodesign Directive – 2009/125/EEC*		
☐	Regulation EC No. 1275/2008	☐	Regulation EC No. 278/2009
☐	Regulation EC No. 642/2009	☐	Regulation EC No. 617/2013

☒	*RoHS Directive – 2011/65/EU*		

☒	***Equipment Class 1***	☐	***Equipment class 2***		

Description of accessories and components, including software, which allow the radio equipment to operate as intended and covered by the DoC:

Accessories:	
Description:	Model Name:
Description 1	Model 1
Description 2	Model 2
Description 3	Model 3

RADIO EQUIPMENT TYPE DIRECTIVE 2014/53/EU7

Hereby, Si-Ware Systems, declares that the radio equipment type NeoSpectra Scanner-10 mm, is incompliance with Directive 2014/53/EU

NeoSpectra™ by Si-Ware

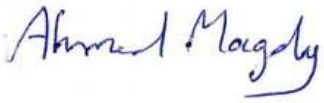
Software Description:	Version:
	FW 2206054218

Wireless Module:		
Description:	Module type:	Certificate number:
BLE Module	ESP32-WROOM-32D	B2006163

Signed for and on behalf of:

Place: Cairo place
Date: 02 Feb 2023 date

Name: Ahmed Magdy
Function: General Manager
Signature:



RADIO TRANSMISSION EQUIPMENT TYPE APPROVAL CERTIFICATE

This device is certified to conform to the provisions of the Radio Regulations of the People's Republic of China, with CMIIT ID 2023DJ9547.

无线电发射设备
Radio Transmission Equipment
型号核准证
Type Approval Certificate

埃及 Si-Ware Systems:

根据《中华人民共和国无线电管理
In accordance with the provisions on the Radio

条例》，经审查，下列无线电发射设备
Regulations of the People's Republic of China , the following

符合中华人民共和国无线电管理规定和
radio transmission equipment , after examination , conforms

技术标准，其核准代码为： CMIIT ID:2023DJ9547
to the provisions with its CMIIT ID:

中华人民共和国工业和信息化部

(发证机关)
Sealed by issuing authority

有效期： 2025-12-31
Validity

2023 年 06 月 21 日
Year Month Date

RADIO TRANSMISSION EQUIPMENT TYPE APPROVAL CERTIFICATE

This device is certified to conform to the provisions of the Radio Regulations of the People's Republic of China, with CMIIT ID 2023DJ9547.

编号：
Number 2023-9547

设备名称：蓝牙设备
Equipment Name

设备型号：NE01001
Equipment Type

主要功能：数据传输
Main Functions

调制方式：GFSK
Modulation Mode

主要技术参数及其指标值：
Main Technical Parameters

频率范围：2400-2483.5MHz
Frequency Range

频率容限：≤20ppm
Frequency Tolerance

发射功率：≤20dBm(EIRP)
Transmitting Power

占用带宽：≤2MHz
Occupied Bandwidth

杂散发射限值：≤-30dBm
Spurious Emission Limits

（核发单位章）
Sealed by issuing authority

2023 年 06 月 21 日
Year Month Date

BLUETOOTH

This device complies with the Bluetooth Launch Studio Terms of use under declaration ID D065301

Bluetooth®

Project Details

Project Name	NeoSpectra Scanner NEO1001
Referenced Qualified Design(s)	164224 103832
Listing Date	2023-08-29
Declaration ID	D065301

Product Listing(s)

Name	Website	Category	Publish Date	Model Number	Description
NeoSpectra Scanner	https://www.si-ware.com/	Unique Products	8/29/2023 12:00:00 AM	NEO1001	Handheld spectral sensing scanner

Member Company	Si-ware Systems

Declaring Member Contact / Listing Contact Person

Name	Ahmed Saleh
Address	50 Tice Boulevard
City	Woodcliff Lake
State	New Jersey
Country	United States
Postal Code	07677

Complete the Project and Submit Product(s) for Qualification

By typing my name or other symbol of my signature into the "Signature" field below, I agree on behalf of Si-ware Systems ("Company") to Bluetooth Launch Studio Terms of Use, and I make the following representations and warranties personally and on behalf of Company. The following representations and warranties, together with all project information and the Bluetooth Launch Studio Terms of Use, are the Supplier Declaration of Conformity and Declaration of Compliance described in the Program Reference Document (PRD) and Declaration Process Document (DPD).

- ☑ I am authorized by Company to submit all of the information included in this project and all information is complete and accurate.
- ☑ Company does not, by its governing documents or other applicable law, require more than one signatory, a stamp or seal, or a witnessed signature to be legally bound.
- ☑ I agree on behalf of Company to contract in English and electronically, and adopt the characters and symbols input in the signature field below as my signature, with the same effect as an ink signature.
- ☑ The products included in this project are owned and distributed by Company under a Product name that identifies Company as the source of the Product. Company has the right to use and reference all Qualified Designs referenced in the project, and the products and referenced Qualified Designs comply with the version of the Bluetooth Specification identified in the project submission.
- ☑ The product(s) included in this project and the corresponding Qualified Designs comply with the Bluetooth Launch Studio Terms of Use.

If any of the foregoing is not correct or you do not agree, you must exit this form without signing.

Signature:

Ahmed Saleh

BLUETOOTH

This device complies with the Bluetooth Launch Studio Terms of use under declaration ID D065301

BLUETOOTH® LAUNCH STUDIO TERMS OF USE

Last Updated: November 15th, 2022.

These Bluetooth Launch Studio Terms of Use ("**Launch Studio Terms**") are a supplement to the Bluetooth SIG Website Terms of Use ("**WTOU**") and together the Launch Studio Terms and WTOU are a legal agreement (collectively the "**Bluetooth Terms**") between you and Bluetooth SIG, Inc., a Delaware corporation ("**Bluetooth SIG**") that governs your access to and use of the Bluetooth Launch Studio (the "**Launch Studio Tool**").

The Launch Studio Tool is a Service (as defined in the WTOU) offered by Bluetooth SIG. Terms used but not defined in these Launch Studio Terms have the meanings ascribed to them in the WTOU. In the event of a conflict between these Launch Studio Terms and the WTOU, these Launch Studio Terms will govern.

PLEASE READ THE BLUETOOTH TERMS CAREFULLY. BY ACCESSING OR USING THE LAUNCH STUDIO TOOL AND/OR CLICKING TO INDICATE THAT YOU AGREE TO THE LAUNCH STUDIO TERMS, YOU REPRESENT THAT YOU ARE AUTHORIZED TO BIND THE ENTITY UNDER WHOSE BLUETOOTH SIG MEMBERSHIP YOU OBTAINED A USER ACCOUNT AND THAT YOU AND THAT MEMBER AGREE TO BE BOUND BY THE BLUETOOTH TERMS. IF YOU ARE NOT AUTHORIZED OR DO NOT AGREE TO THE BLUETOOTH TERMS, DO NOT ACCESS OR USE THE LAUNCH STUDIO TOOL OR CLICK TO INDICATE THAT YOU AGREE TO THESE LAUNCH STUDIO TERMS.

1. MEMBERSHIP ACCOUNT REQUIREMENT.

To access and use the Launch Studio Tool, you must have an Account (as defined in the WTOU) issued under the membership account of a current Bluetooth SIG member and log into the Launch Studio Tool with that Account. You acknowledge and agree that when you access the Launch Studio Tool that you are doing so on behalf of the member your Account is associated with ("**Member**") and you represent and warrant that you are authorized by Member to access and use the Launch Studio Tool and provide Submissions (defined below) on Member's behalf.

2. BLUETOOTH QUALIFICATION PROCESS.

The "**Bluetooth Qualification Process**" is the process created by Bluetooth SIG for qualifying Products. The Launch Studio Tool is the Bluetooth SIG tool designed to implement the Bluetooth Qualification Process. A "**Product**" means a product that:

(a) if sold, is sold as a single item (consisting of software, firmware, drivers, applications, hardware, or a combination of some or all of the foregoing);

(b) contains one or more Portions; and

(c) if marketed, is marketed under a name and/or trademark that uniquely identifies Member as the source of the product. A "**Portion**" means hardware, software, or a combination of hardware and software that implements a Bluetooth Specification. If the hardware, software, or combination contains or consists of more than an implementation of the Bluetooth specification, the "Portion" is only the implementation of the Bluetooth Specification. "**Bluetooth Specification**" is defined in the Bylaws of Bluetooth SIG.

3. REPRESENTATIONS AND ACKNOWLEDGEMENTS.

(a) You represent and warrant that you have permission to submit to Bluetooth SIG all information and materials (including design information, product information, test reports, and test results) that you provide through the Launch Studio Tool ("**Submissions**") and that all Submissions are true, complete, and accurate.

(b) You represent and warrant that you and Member will comply with the SIG Member Terms (as defined in the WTOU).

(c) You represent and warrant that all Submissions that you make through the Launch Studio

This device complies with the Bluetooth Launch Studio Terms of use under declaration ID D065301

Tool and all Products listed in your Submissions comply with the SIG Member Terms (as defined in the WTOU) and the Bluetooth Specification(s) referenced in your Submission.

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Certificate of Registration

This is to certify that Information Security Management System of

SI-WARE

3, Khaled Ibn Al Waleed St. Sheraton Heliopolis, Cairo 11361, Egypt

is in accordance with the requirements of the following standard

ISO/IEC 27001:2013

(Information Security Management System)

SCOPE

FT-NIR END-TO-END REAL TIME MATERIAL SENSING SPECTROSCOPY LABORATORY - FREE SOLUTIONS PLANNING, DESIGN, DEVELOPMENT, SUPPORT, MONITORING, EVALUATION AND IMPROVEMENT.

(SOA Version - 1.0, Dated - Jan 2022)

Certificate Number : SCK/05/SIW/22/20/1503

To verify certificate, visit at :
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Initial Registration Date : 20-Jun-2022
1st Surveillance Date : 20-May-2023
2nd Surveillance Date : 20-May-2024
Certificate Expiry Date : 19-Jun-2025

Issued by SCK Certifications Pvt. Ltd.

Director

Uses of portable FT-NIR to determine cannabinoids and terpenes in dry-cured cannabis flowers

Marcal Plans1 ; Adham Hesham1 ; Ruben Valenzuela2

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INTRODUCTION

The cannabis industry is growing exponentially worldwide. The crop can engage old and new farmers to adopt it as a novel crop. In that sense, there is a need for fast, on-site, accurate technology to provide the growers, distributions, and producers with a tool to manage the qualitycontrolof theirsitesandimprovecropoptimization.
NIR infrared hasshown thepotentialtobeused asatool topredictthe cannabinolscontentindry-curedflowershemp(1)andcannabis(2). Handheld portable devices provide good performance to predict quantitative levels of cannabinols in flowers (2). This has opened a lot of opportunities to implement this technology in the field and directly to the quality control; from the crop to the distributor to the medical dispensary. Increasing the traceability of the production and improving the transparency for the final user.

METHODOLOGY

A Total of 7000 samples were used to calibrate the cannabinols, and 4000 samples to calibrate the total terpenes. The reference analyses were done using ISO certified HPLC-PDA method for cannabinols and GC-FID for the total terpenes.

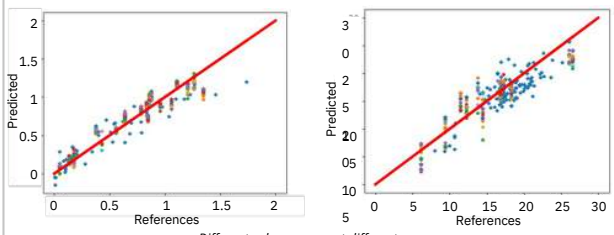
Partial Least Square regression (PLSR) was used to correlate the spectra obtained from NeoSpectraScanners (17 scanners (Si-Ware Inc., Menlo Park, CA, USA)) from 1350 –2550 nm with the reference analysis.

RESULTS

Models showed a good performance predicting THC, CBD, CBG, Total Terpenes, THC acid, and CBD acid with a low error of predictions.

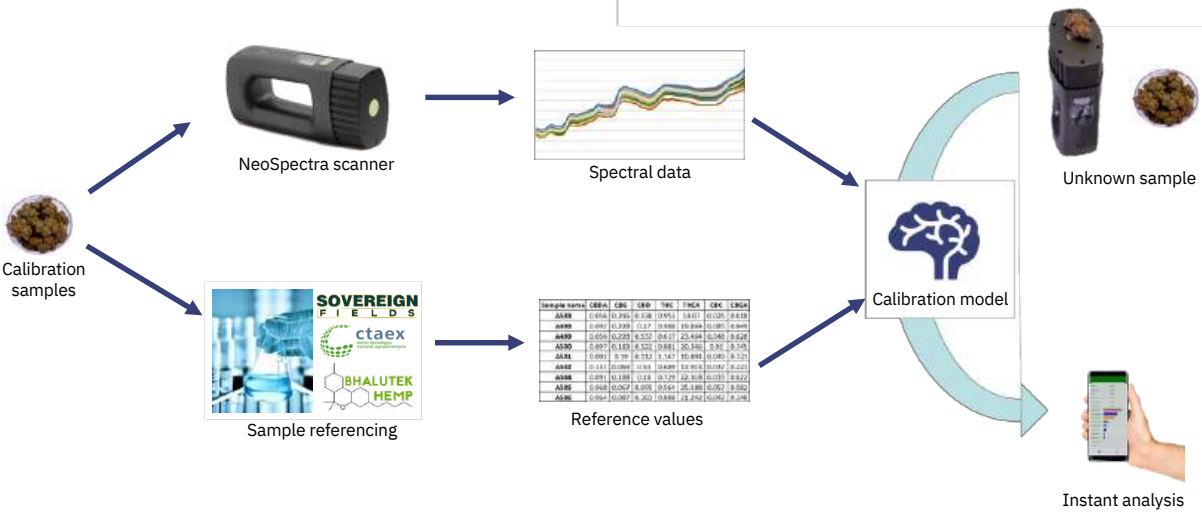
	Low Concentration 0-3%				High Concentration 3-30%			
	RMSECVR2	2cv	RMSEP	Rp	RMSECVR	cv	RMSEP	Rp
CBD Total	0.19	0.80	0.16	0.91	1.60	0.89	1.70	0.91
THC Total	0.15	0.85	0.10	0.93	2.10	0.91	2.10	0.90
CBG Total	0.15	0.71	0.11	0.72				
Total Terpenes	0.20	0.70	0.30	0.65				
THC acid	0.16	0.84	0.11	0.91	2.20	0.90	2.20	0.89
CBD acid	0.20	0.79	0.18	0.90	1.65	0.88	1.75	0.90

PLS models for THC and CBD show good linearity between predicted levels and measured by HPLC-PDA levels of the cannabinoids.



Different colors represent different scanners

Fig 1. Predicted THC total vs the HPLC-PDA levels in the low range (left) and high range (right).



CONCLUSIONS

Si-Ware technology coupled with Valenveras as the expert in the cannabis sector, provides reliable and robust models. The current FT-NIR technology could be used as an alternative to the classical HPLC and GC analysis for in-situ analysis of the cannabis flowers. Moreover, besides the prediction of the cannabinols, total terpenes also can be predicted, giving the final user the tools to discriminate between high and low content of phenotypes.

REFERENCES

1.Yao, S., Ball, C., Miyagusuku-Cruzado G., Giusti, M., Aykas, D., Rodriguez-Saona, L. 2022. A novel handheld FT-NIR spectroscopic approach for real-time screening of major cannabinoids content in hemp. Talanta. Sep 1;247:123559
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Agroalimentario "Extremadura"
Centro Tecnológico nº 80

Badajoz, 29 May 2024

The cannabinoid analysis data used by the company Valenveras for the calibration of the NEOSPECTRA (SI-WARE) equipment were performed by HPLC-DAD techniques by the AOAC 2018.11 method of analysis. They have been performed by HPLC-DAD techniques by the method of analysis of the AOAC 2018.11. The PE-1938 method of analysis for cannabinoid quantification is accredited under the UNE-EN ISO/IEC 17025:2017 standard in different matrices and ranges (attached scope of accreditation).

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SOP FOR SAMPLE PREPARATION

VALENVERAS
Powered by Si-Ware

2025

INTRODUCTION

This procedure outlines the steps for preparing dried and ground cannabis samples for NIR analysis using the Valenveras Portable Lab, ensuring accurate measurement of cannabinoids, terpenes, and nutrients. It is intended for end-users involved in sample preparation for Valenveras analysis.

MATERIALS & EQUIPMENTS

GRINDER

BRUSH

MESH

WIPES

OVEN OR AIR FRYER

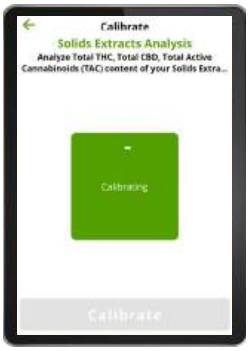
ISOPROPYL ALCOHOL

CALIBRATION

1 - Turn on the Valenveras analyzer

2 - Place the sample cup in the correct place

3 - Remove the calibration tile lid. Place the white calibration tile inside the cup, facing down.



4 - Press the calibration function in the app. calibration time is 8 seconds.

5- The calibration white tile must be kept clean at all times. Ensure it is not touched and always cover it back with its lid.

SAMPLE PREPARATION METHODOLOGY FOR **NATURAL DRY FLOWERS**

Cannabis Analys...

1 - **COLLECT THE SAMPLE**

Collect cannabis samples ensuring they represent the batch accurately. Handle the samples with gloves to prevent contamination.

2 - **GRIND SAMPLES**

Grind a minimum of 3 grams of the dried sample using the grinder until the smallest possible particle size is achieved.

Clean the grinder between samples to prevent cross- contamination.

3 - **SIEVING**

Pass the ground sample through a sieve (e.g., 1mm mesh) to achieve a uniform particle size.

Discard larger particles that do not pass through the sieve.

4 - **CALIBRATION** & **ANALYZE**

1. Clean the glass surface of the sample cup with alcohol.
2. Calibration.
3. Place the ground material into the sample cup. **Make sure the material covers the entire surface of the cup and press it with the sample press.**
4. Analysis: Follow the prompts on the Mobile App to complete the analysis.

SAMPLE PREPARATION METHODOLOGY FOR **NATURAL FRESH FLOWERS**

Cannabis Analys...
EXPRESS

1 - COLLECT THE SAMPLE

Collect cannabis samples ensuring they represent the batch accurately. Handle the samples with gloves to prevent contamination.

2 - TRIM SAMPLES

Trim the cannabis as it will appear in the final product. Ensure uniformity to reflect real final flowers.

3 - DRY SAMPLES

Dry the samples using an oven or air cooker set to 140°F (60°C) for 24 hours, or until their weight remains stable.

4 - CALIBRATION & ANALYZE

1. Clean the glass surface of the sample cup with alcohol.
2. Calibration.
3. **Place the ground material into the sample cup. Make sure the material covers the entire surface of the cup and press it with the sample press.**
4. Analysis: Follow the prompts on the Mobile App to complete the analysis.

SAMPLE PREPARATION METHODOLOGY FOR **NATURAL FRESH LEAVES**

1 - COLLECT THE SAMPLE

Collect cannabis samples ensuring they represent the batch accurately. Handle the samples with gloves to prevent contamination.

2 - DRY SAMPLES

Dry the samples using an oven or air cooker set to 140°F (60°C) for 2 hours, or until their weight remains stable.

3 - GRIND SAMPLES

Grind a minimum of 1 grams of the dried sample using the grinder until the smallest possible particle size is achieve. Clean the grinder between samples to prevent cross-contamination.

4 - CALIBRATION & ANALYZE

- Clean the glass surface of the sample cup with alcohol.
- Calibration.
- Place the ground material into the sample cup. **Make sure the material covers the entire surface of the cup and press it with the sample press.**
- Analysis: Follow the prompts on the Mobile App to complete the analysis.

SAMPLE PREPARATION METHODOLOGY FOR **SOLID EXTRACT**


Solids Extracts

1 - COLLECT THE SAMPLE

Collect cannabis samples ensuring they represent the batch accurately. Handle the samples with gloves to prevent contamination.

2 - PREPARE THE SAMPLE

Place the sample in the sample cup and press it with the sample press. This ensures a uniform surface for analysis.

3- CALIBRATION & ANALYZE

Place the ground material into the sample cup.
Make sure the material covers the entire surface of the cup and press it with the sample press. (This ensures a uniform surface for analysis).
Follow the prompts on the Mobile App to complete the analysis.

SOP FOR SAMPLE PREPARATION

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