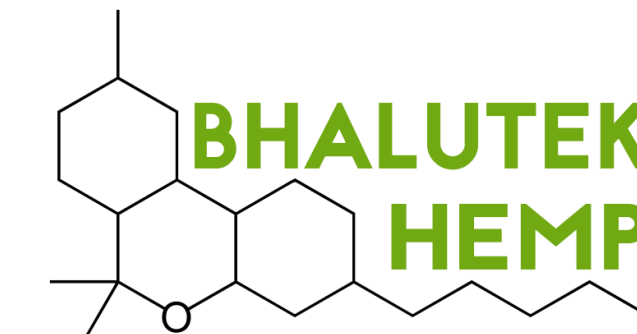


Uses of portable FT-NIR to determine cannabinoids and terpenes in dry-cured cannabis flowers



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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, distributors, and producers with a tool to manage the quality control of their sites and improve crop optimization.

NIR infrared has shown the potential to be used as a tool to predict the cannabinoids content in dry-cured flowers hemp (1) and cannabis (2).

Handheld portable devices provide good performance to predict quantitative levels of cannabinoids 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 cannabinoids, and 4000 samples to calibrate the total terpenes. The reference analyses were done using ISO certified HPLC-PDA method for cannabinoids and GC-FID for the total terpenes.

Partial Least Square regression (PLSR) was used to correlate the spectra obtained from NeoSpectra Scanners (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%			
	RMSECV	R ² _{cv}	RMSEP	R ² _p	RMSECV	R ² _{cv}	RMSEP	R ² _p
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.

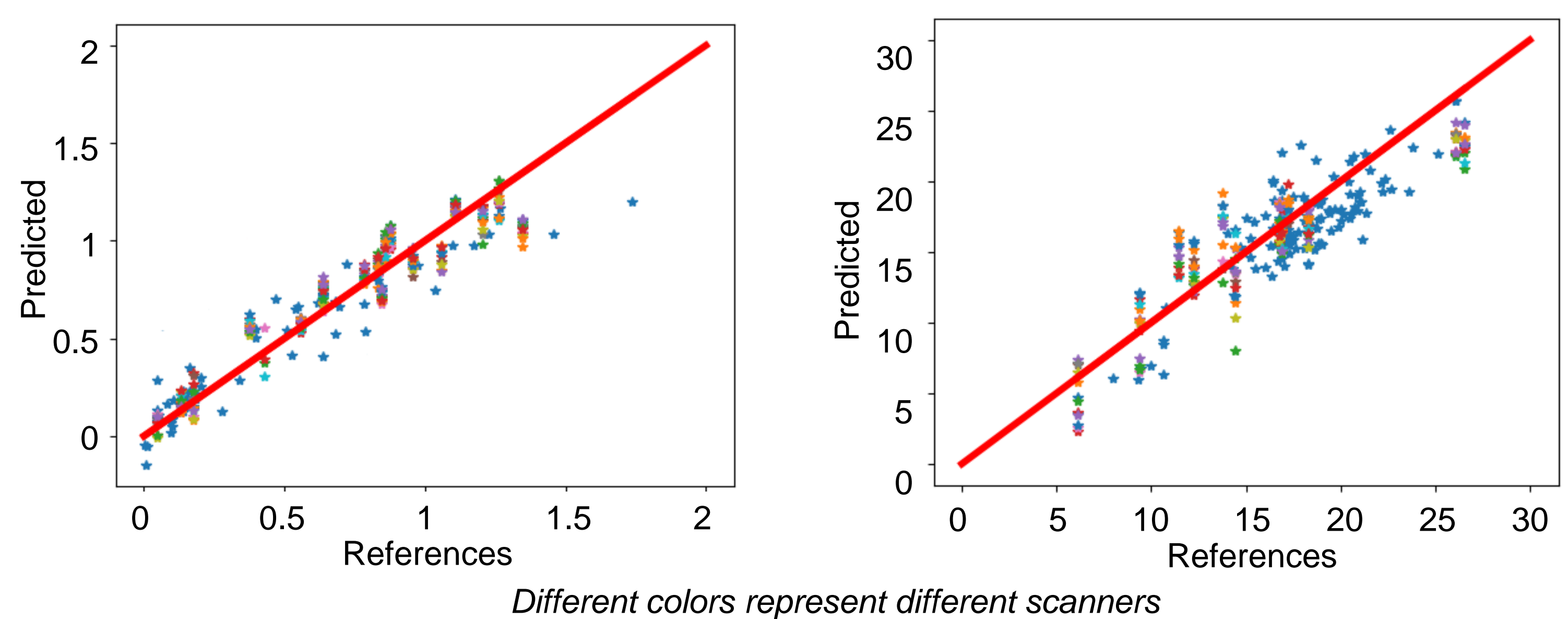
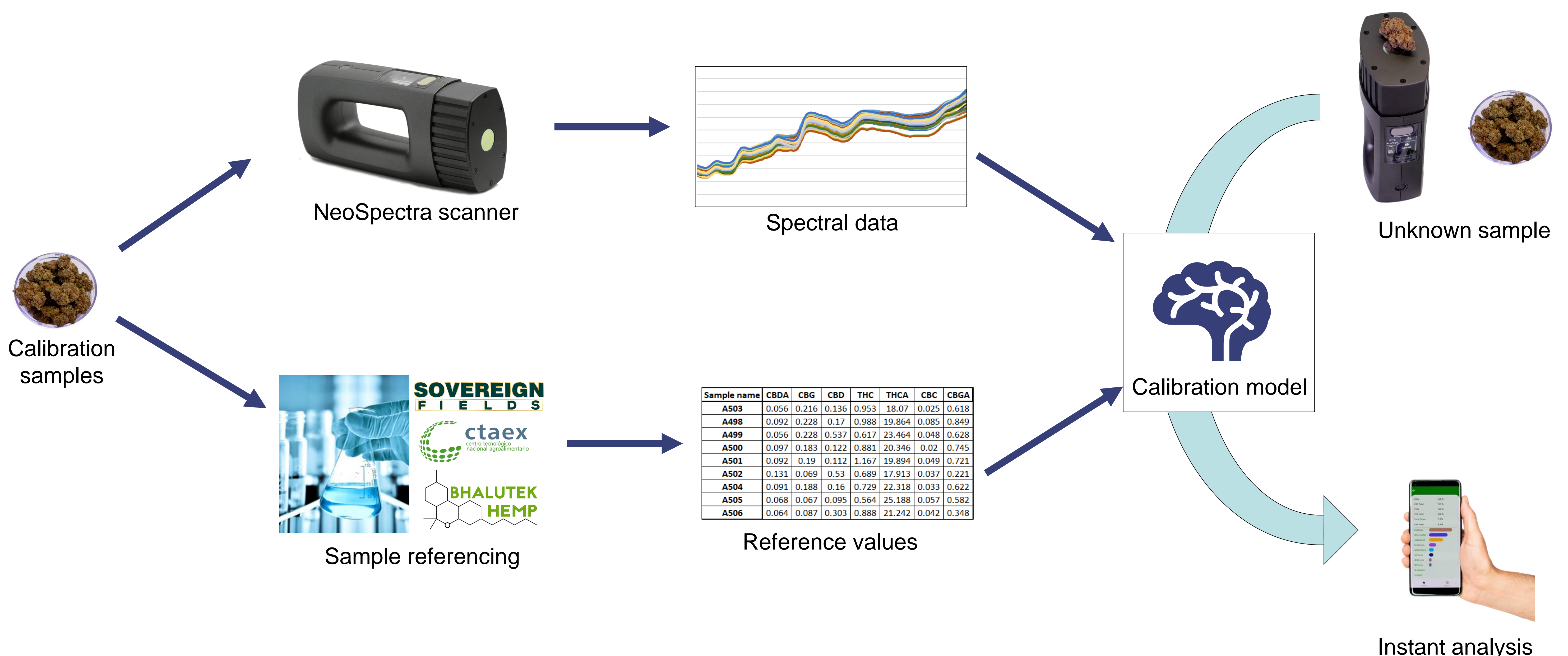


Fig 1. Predicted THC total vs the HPLC-PDA levels in the low range (left) and high range (right). Different colors represent different scanners



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 cannabinoids, total terpenes also can be predicted, giving the final user the tools to discriminate between high and low content of phenotypes.

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