

A comprehensive analysis of volatile profile of *Cannabis sativa* L. variety Futura essential oil by Under Vacuum GCxGC-TOF and GC-VUV

Eligio D. Sebastiani¹, F. Villanelli², Francesca Ieri³, Luca Calamai^{4,5}, Annalisa Romani^{2,3}

1 SRA INSTRUMENTS SpA ,Via alla castellana 3, 20063 Cernusco S/N Milano, Italy

2 QuMAP Laboratory - PIN Polo Universitario Città di Prato, Piazza Giovanni Ciardi, 25, 59100 Prato, Italy

3 PHYTOLAB laboratory - DiSIA ?Department of Statistic, computer science, Applications - University of Florence, Viale Morgagni, 59, 50134 Florence, Italy

4 DISPAA - Department of Agriculture, Food and Environmental Science - University of Florence, Piazzale delle Cascine, 18, 50144 Florence, Italy

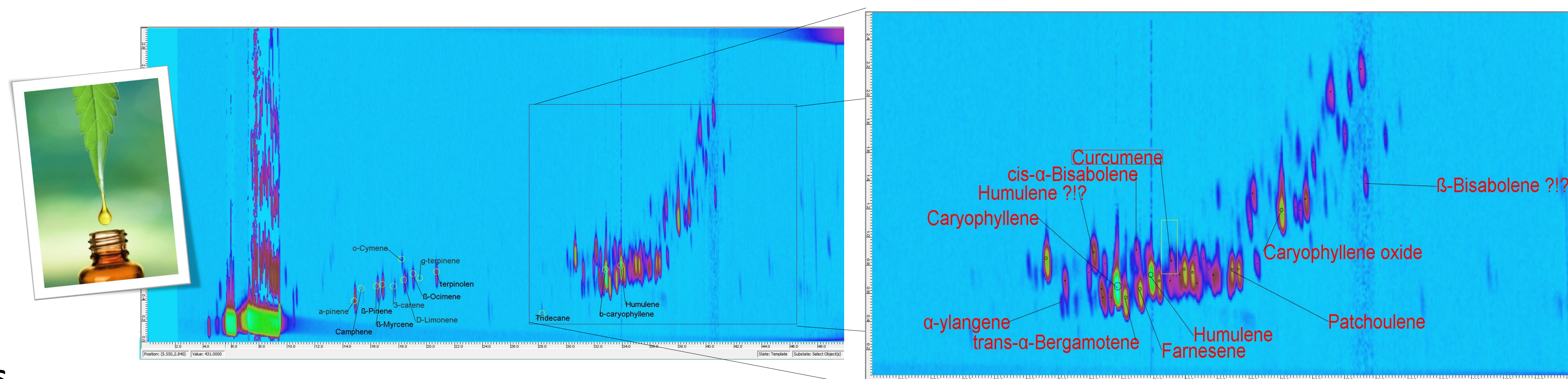
5 Laboratory for the Analysis and Research in Environmental Chemistry (ARCA)-IBBR - CNR, Via Madonna del Piano 10, 50019 Sesto Fiorentino (FI), Italy

INTRODUCTION

Hemp (*Cannabis sativa* L.) is an annual species, native of central Asia and spread in Europe and Africa, source of hundreds of biological active compounds such as cannabinoids, terpenoids, flavonoids and polyunsaturated fatty acids. Hemp essential oil, with its unique smell is, at present, used in cosmetic and perfume products, aromatherapy and as beer flavouring agent. The sesquiterpenes fraction is very complex to discriminate, and the mass spectra of the different compounds are often not enough to discriminate between them. In the present work we used the recognition capability of Vacuum Ultra Violet Detector (VUV) to help to discriminate between the isomers.

MATERIAL AND METHODS

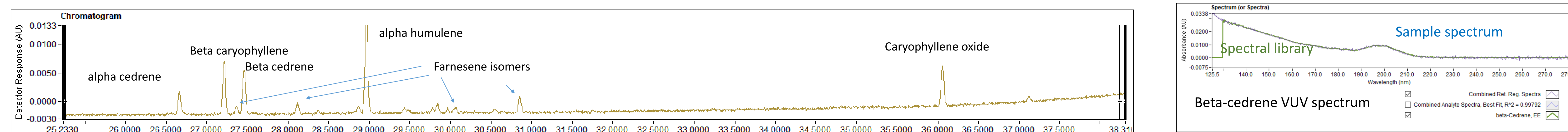
Essential oil of cannabis Futura obtained by steam distillation was analyzed by GC-MS using two different and innovative techniques: a GCxGC system composed Agilent GC-MS 7890B, with capillary flow modulator device for comprehensive separation, coupled to an TOF-DS Markes detector without split (Under_Vacuum_Total_Flow up to 10 ml/min); in this system the first dimension column is a 20 meters HP5 and the second dimension is constituted by 5 meters of innovax column, 0,32 mm id. The samples were injected in a GC Agilent 7890B connected to a VUV 101detector (VUV Analytics) equipped with a 60 Innovax column. To compare the chromatogram profile we injected a mixture of 6 sesquiterpenes, to verify if the instruments were able to discriminate them.



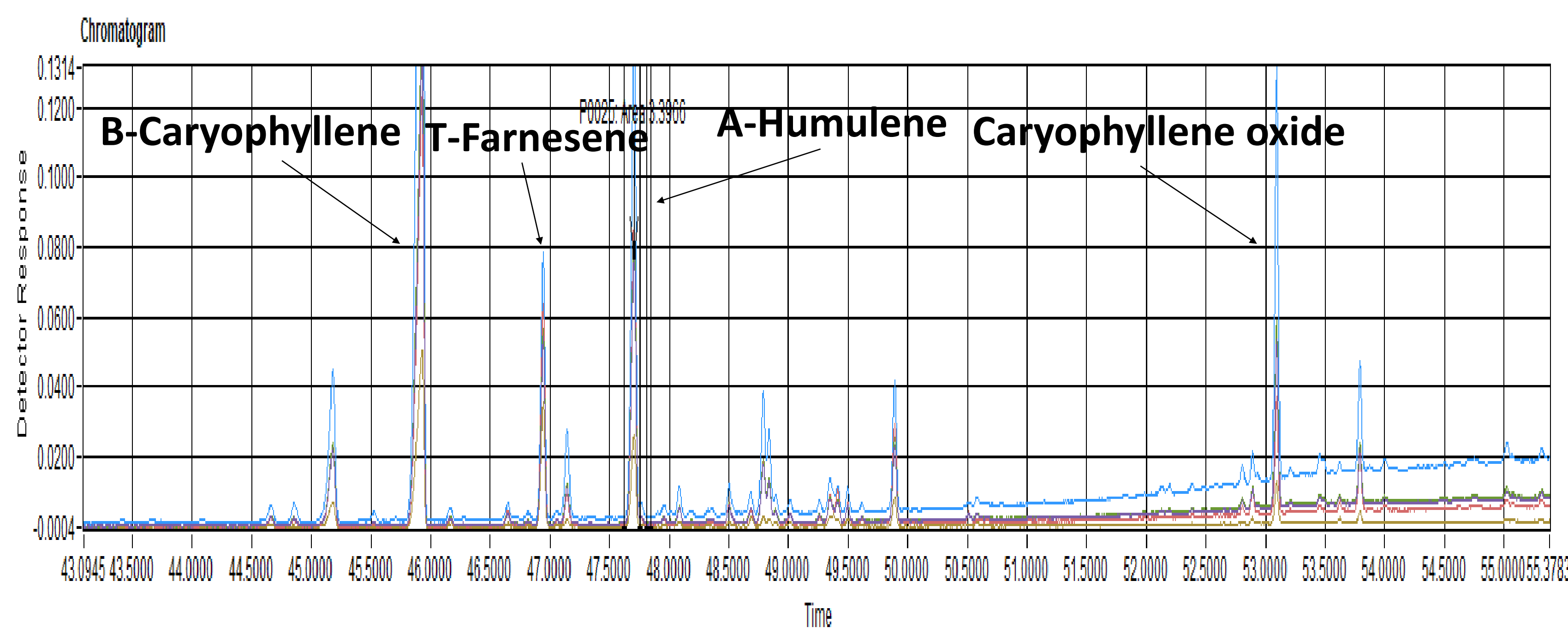
RESULTS

GCxGC-MS is currently adopted as separation technique not only because of its high separation power and sensitivity but also for its ability to produce more widely distributed and rationalized peak patterns [1] for chemically correlated group of analytes. Hemp essential oil showed 3 separated regions corresponding to the classes of monoterpenes, sesquiterpenes and oxygenated sesquiterpenes. The blob detection of the GCxGC software detects a large number of blobs (110) subtracting base line blobs and background interferences, but the region corresponding to the sesquiterpenes group, showed many blobs with similar mass spectra giving no certainty about the identification.

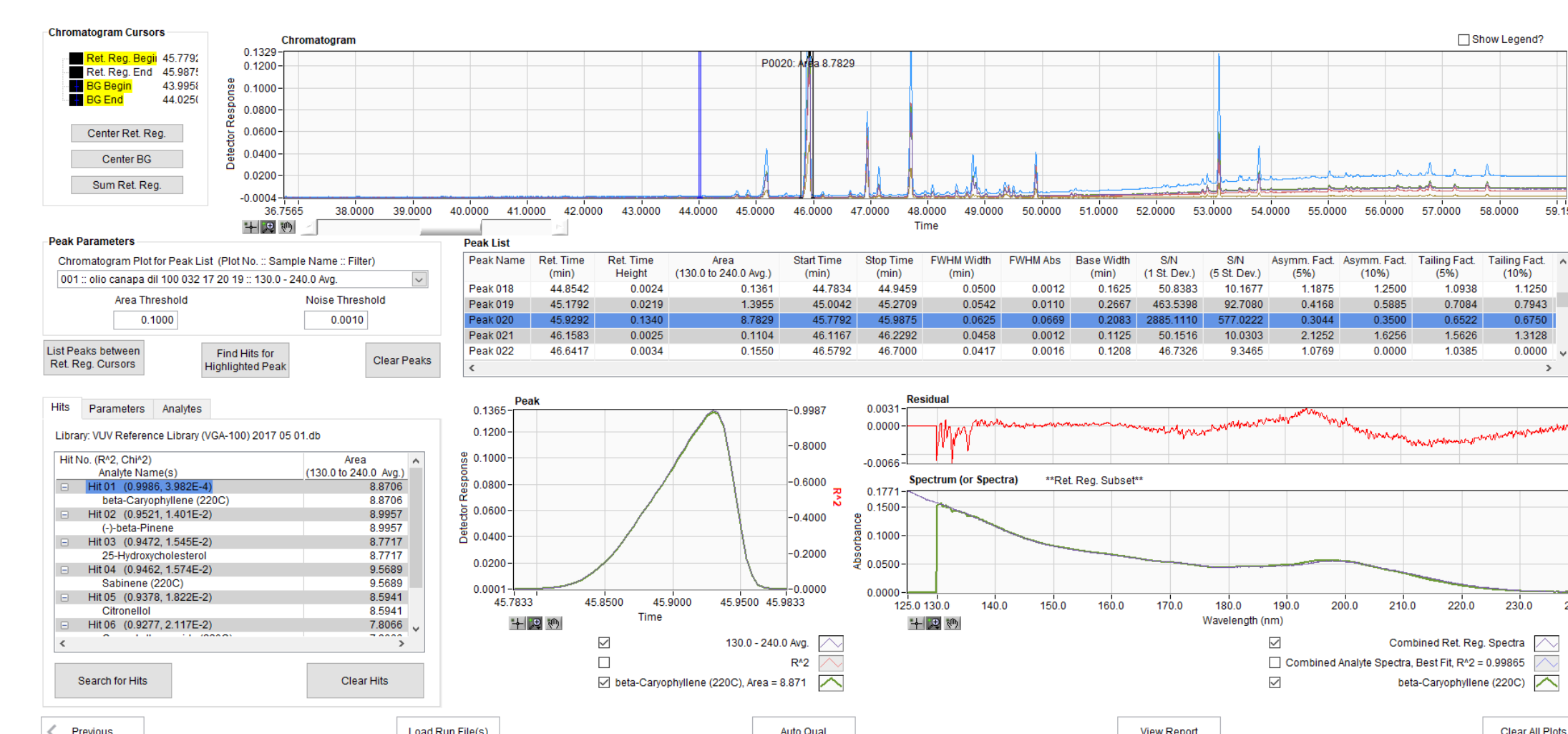
The VUV detector could be useful to do this, but we tested before on a standard mix of sesquiterpenes, using the Retention Index and the VUV spectra to confirm the identification of each peak.



The VUV detector showed the capability to discriminate among different isomers and we used to analyze the canapa oil sample and some compounds in the sample were identified by the software



The VUV software detect automatically the peak in the sample and it compared them to an internal spectral UV library.



CONCLUSIONS

The GCxGC TOF analysis showed a very high sensitivity, but for some compounds the mass spectrum is not specific enough to assure a correct identification.

The Retention Index reference is useful to predict the elution order, but the possibility to use a different detector can give better results. VUV detector give additional information to identify, in presence of a large number of isomer, the correct peak.

REFERENCE

[1] Cordero et al., J Agric Food Chem 56 (2008) 7655–7666.

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