OPEN ACCESS

Scientific Letters

III 1H-TOXRUN
International Congress 2024
02-03 May, 2024 | Porto, Portugal

*Poster 47*

# Phytocannabinoid profiling in cannabis extracts: derivatization and gas chromatography optimization

**Bibiana S. Ribeiro [1,2], Cláudia Ribeiro [1,2], Carlos J. A. Ribeiro [1,2,3] and Eduarda M. P. Silva [1,2,*]**

[1] Associate Laboratory i4HB - Institute for Health and Bioeconomy, University Institute of Health Sciences - CESPU, 4585-116 Gandra, Portugal
[2] UCIBIO - Applied Molecular Biosciences Unit, Translational Toxicology Research Laboratory, University Institute of Health Sciences (1H-TOXRUN, IUCS-CESPU), 4585-116 Gandra, Portugal
[3] Avextra Portugal SA, 7570-003 Grândola, Portugal

* Correspondence: eduarda.silva@iucs.cespu.pt

## Abstract

**Background:** Cannabis has been used for years for both medicinal and recreational purposes, having its potential therapeutic benefits attributed to cannabinoids [1]. Cannabis-based treatments are gaining popularity, with delta-9-tetrahydrocannabinol (THC) being approved by Food and Drug Administration for chemotherapy side effects and cannabidiol (CBD) for seizures [2,3]. Hence, characterization of chemical extracts of cannabis is imperative for medical purposes and to assess its environmental impact. Gas chromatography coupled with mass spectrometry (GC-MS) is the most common technique used for quantifying cannabinoids in plant extracts due to its high sensitivity [4,5]. **Objective:** Optimization of the derivatization and chromatographic procedures for cannabinoids analysis. Development of a GC-MS method for the simultaneous quantification of several cannabinoids present in different extracts of the *Cannabis* sp cultivar ZF plant, a commercially available hybrid weed strain. **Methods:** Compounds were derivatized using *N*-methyl-*N*-trimethylsilyltrifluoroacetamide with 1% trimethylchlorosilane (MSTFA + 1% TMCS) and pyridine and heated at 60 ˚C for 30 min. Subsequently, the solution was evaporated, reconstituted in anhydrous ethyl acetate, and analyzed by GC-MS. The chromatographic conditions were established using a capillary column containing 5% diphenyl-95% dimethylpolysiloxane (30 m × 0.25 mm × 0.25 µm), an injector temperature set to 280 ºC, with a temperature ramp starting at 100 ºC and increasing up to 280 ºC at a flow rate of 1 mL/min to a total run of 20 min. **Results:** Different proportions of MSTFA + 1% TMCS and pyridine, heating temperature and time were attempted for optimization of the derivatization conditions. Established conditions allowed the identification of cannabinoids while preventing the decarboxylation of the more sensitive acidic cannabinoids. Chromatographic conditions were also optimized to allow the simultaneous separation of the compounds in the same run. **Conclusions:** Derivatizations conditions were optimized, and gas chromatographic conditions were established for the analysis of cannabinoids in cannabis extracts.

**Keywords:** cannabinoids; phytochemical analysis; medicinal cannabis

## Acknowledgments

This research was funded by Avextra Portugal SA., by the supply of the standards used.

## References

1. Legare C.A.; Raup-Konsavage W.M.; Vrana K.E. Therapeutic Potential of Cannabis, Cannabidiol, and Cannabinoid-Based Pharmaceuticals. Pharmacology (2022), 107(3-4), 131-149.
2. Cardenia V.; Toschi T.G.; Scappini S.; Rubino R.C.; Rodriguez-Estrada M.T. Development and validation of a Fast gas chromatography/mass spectrometry method for the determination of cannabinoids in *Cannabis sativa*. L. J. Food Drug Anal. (2018), 26 (4), 1283-1292.

3. Gilmore A.M.; Elhendawy M.A.; Radwan M.M.; Kidder L.H.: Wanas A.S., Godfrey M.; Hildreth J.B., Robinson A.E.,; ElSohly M.A. Absorbance-Transmittance Excitation Emission Matrix Method for Quantification of Major Cannabinoids and Corresponding Acids: A Rapid Alternative to Chromatography for Rapid Chemotype Discrimination of *Cannabis sativa* Varieties. Cannabis Cannabinoid Res. (2023), 8 (5), 911-922.
4. Nahar L.; Guo M.; Sarker S.D. Gas Chromatographic Analysis of Naturally Occurring Cannabinoids: A Review of Literature Published During the Past Decade. Phytochem. Anal. (2020), 31 (2), 135-146.
5. Pourseyed Lazarjani M.; Torres S.; Hooker T.; Fowlie C.; Young O.; Seyfoddin A. Methods for quantification of cannabinoids: a narrative review. J Cannabis Research (2020), 2 (1): 35.