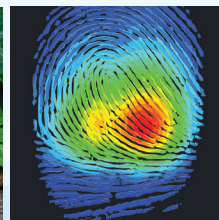


Quantification of Major Cannabinoids and Corresponding Acids with A-TEEM™ Spectroscopy



Application Note
Agricultural Sciences
FL-2024-9-24

Introduction

The cannabis plant (*Cannabis sativa*) contains naturally occurring phytocannabinoids, with D9-tetrahydrocannabinol (THC) and cannabidiol (CBD) being the most abundant. There is a need for rapid inexpensive methods to measure total THC and THC–CBD ratio (for classifying different cannabis strains).

This study, *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*, conducted at the University of Mississippi and published in 2022 in *Cannabis and Cannabinoid Research*, explores the potential of simultaneous acquisition of absorbance-transmittance excitation-emission matrix data, A-TEEM™ spectroscopy, an optical technique that combines ultraviolet-visible and fluorescence spectroscopy.

Key Findings:

- The A-TEEM technique accurately classifies 49 dry flower extracts into three *C. sativa* chemotypes based on THC-CBD content.
- A-TEEM can quantify total THC and CBD levels with limits of quantification (LOQs) similar to gas chromatography (GC)-flame ionization (FID) and High-Performance Liquid Chromatography (HPLC).
- A-TEEM can be used to separately quantify acid and neutral forms of THC and CBD.

Advantages of A-TEEM:

- Rapid data acquisition (< 45 seconds per measurement)
- Simple sample preparation (solvent extraction)
- Sensitivity to resolve and quantify cannabinoids based on their unique spectral characteristics

Overall, the A-TEEM technique is a promising tool for the qualitative and quantitative characterization of the major cannabinoids in solution.



Aqualog and Autosampler

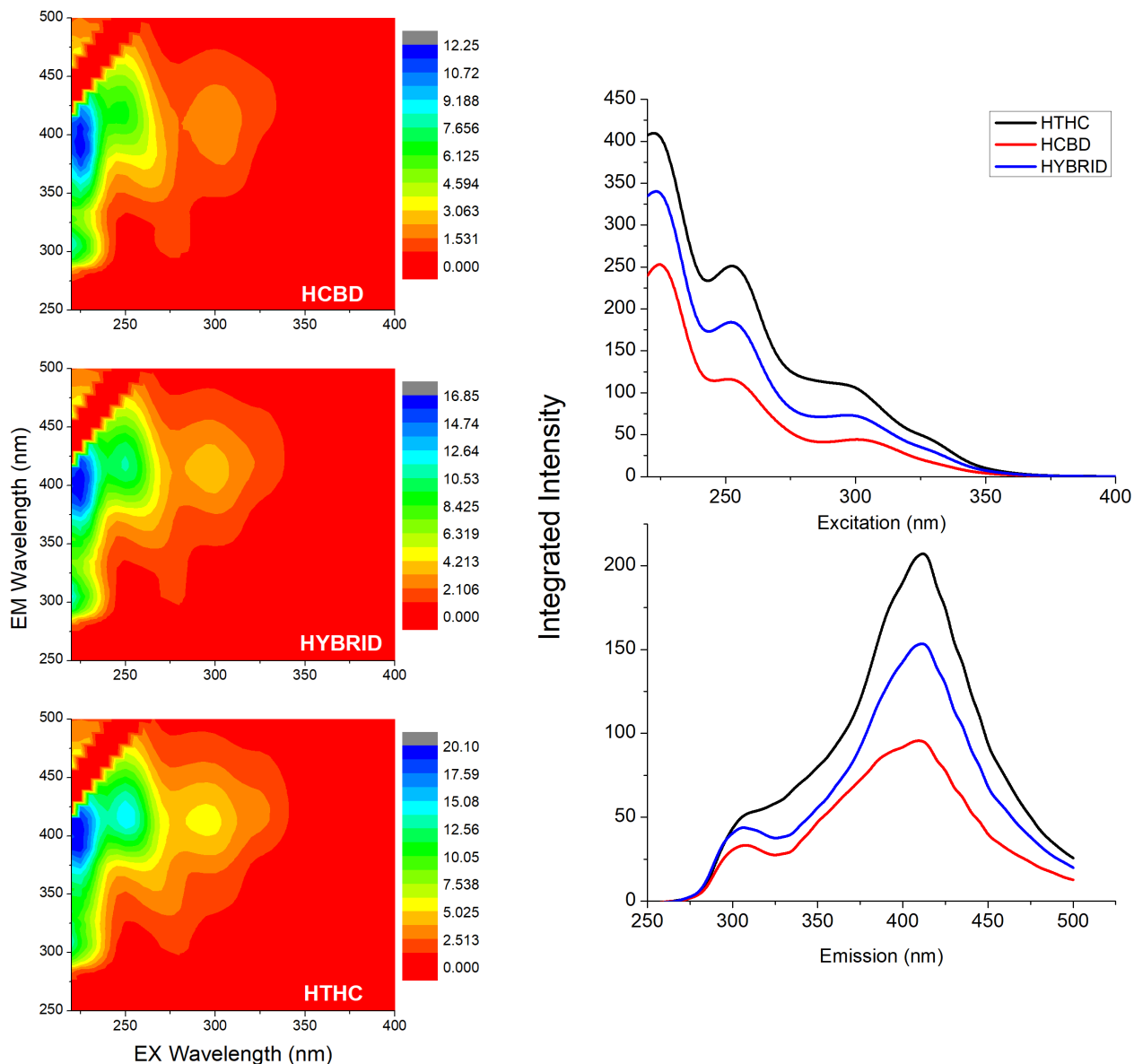


Figure 1: Peak-normalized A-TEEM contours (A–C) and naturally scaled integral excitation- (D) and emissionspectral (E) profiles for flower extracts of HTHC, hybrid and HCBd cannabis varieties. A-TEEM, absorbancetransmittance excitation emission matrix; HCBd, high CBD; HTHC, high THC.

The University of Mississippi's marijuana research project, led by the National Center for Natural Products Research (NCNPR), has been a trusted authority on cannabis studies since 1968. Funded by the National Institute on Drug Abuse (NIDA), the project consistently secures federal

contracts to produce pharmaceutical-grade cannabis for U.S. researchers, including FDA-approved clinical trials. Directed by renowned scientist Dr. Mahmoud ElSohly, the program underscores the university's leading role in advancing cannabis research.

<https://www.liebertpub.com/doi/10.1089/can.2021.0165>

Cannabis Cannabinoid Res. 2023 Oct;8(5):911-922.
DOI: 10.1089/can.2021.0165. Epub 2022 Apr 29.

HORIBA does not support, encourage or promote the use of its products or services in connection with any illegal use, cultivation, or trade of cannabis or cannabis products. HORIBA products are intended to be used only in compliance with all applicable laws in a manner that promotes public safety and/or in connection with any lawful and approved scientific or medical research activities.

info.sci@horiba.com

horiba.com/fluorescence

USA: +1 732 494 8660
UK: +44 (0)1604 542 500
China: +86 (0)21 6289 6060

France: +33 (0)1 69 74 72 00
Italy: +39 06 51 59 22 1
Brazil: + 55 (0)11 2923 5400

Germany: +49 (0) 6251 8475 20
Japan: +81 (0)3 6206 4721
Other: +1 732 494 8660