B13   An Analysis of Cannabis Plant Materials in Drug Enforcement Administration (DEA) Laboratories: A Year in Review

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Learning Overview: After attending this presentation, attendees will better understand the application, benefits, and limitations of implementing a new analysis protocol for cannabis plant material.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing a summary of results and trends observed throughout DEA laboratories during the year following implementation of a new analytical scheme for analysis of cannabis submissions.

Prior to December 2018, DEA laboratories used a three-tier analytical scheme for analysis of cannabis submissions that consisted of macro/microscopical tests, the Duquenois-Levine (DL) color test, and separation analysis using either Thin-Layer Chromatography (TLC), Gas Chromatography/Flame Ionization Detector (GC/FID), or Gas Chromatography/Mass Spectrometry (GC/MS). For many years, this analysis protocol provided the scientific foundation for reporting *Cannabis* conclusions. On December 20, 2018, with the signing of the Agriculture Improvement Act of 2018 (2018 Farm Bill), significant legal changes were implemented, including the definition of "hemp" as "the plant *Cannabis sativa* L. and any part of that plant, including the seeds thereof and all derivatives, extracts, cannabinoids, isomers, acids, salts, and salts of isomers, whether growing or not, with a delta-9 tetrahydrocannabinol (THC) concentration of not more than 0.3 percent on a dry weight basis." The new law also excluded the term "hemp" from the definition of marijuana in the Controlled Substances Act. The change directly affected the manner in which suspected cannabis submissions seized after the Farm Bill were analyzed by the DEA laboratories and prompted the development and validation of a new analysis protocol.

The main objective of this presentation is to provide a summary of analysis results and trends observed during the year following implementation of the new cannabis analytical scheme. This assessment covers laboratory submissions seized after December 20, 2018, and analyzed between June 2018 and August 2020. During this period, over 62,000 single and multi-unit submissions were analyzed by DEA analysts, and approximately 9,000 of them were suspected cannabis submissions. After analysis using the new analytical scheme, 1,278 submission were reported as *Marijuana*, indicating that the morphological characteristics of the materials were consistent with cannabis, the THC:CBD ratio was above 3.0, and the total THC level in each individual unit analyzed was above the administrative decision limit of 1% (w/w). A total of 193 submissions were reported as *Inconclusive*, meaning that at least one unit within the exhibit did not fulfill the minimum criteria needed to report *Marijuana*. Inconclusive reports are generated when at least one of the three tests required by the new analytical scheme, micro/macroscopical analysis, 4-AP color test, and GC/MS analysis fails to produce a positive result.

This presentation will discuss the trends observed when inconclusive results are reported. Among others, the following questions will be addressed: What are the most common factors producing inconclusive findings? Are there regional/geographical differences influencing the results? Are distinguishing cannabinoid profiles observed and correlated with THC-rich and CBD-rich samples? Are low levels of THC always observed in CBD-rich samples? Are low levels of CBD always observed in THC-rich samples? What is the distribution of THC levels observed for hemp-like submissions? Furthermore, this presentation will also include a summary of the results obtained when a selected number of inconclusive samples are further analyzed to determine the total THC level using a Liquid Chromatography/Ultraviolet/Visible (LC/UV/Vis) quantitative method.

Cannabis, Marijuana, Hemp

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