Study Reveals Inaccurate Labeling of Marijuana as Hemp

BY
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THE FEDERAL COMPREHENSIVE DRUG ABUSE PREVENTION AND CONTROL ACT OF 1970 (THE CONTROLLED SUBSTANCES ACT) MADE THE USE AND POSSESSION OF CANNABIS ILLEGAL UNDER FEDERAL LAW.

A major change to the legal status of cannabis occurred with the passage of the Agriculture Improvement Act of 2018, commonly referred to as the 2018 Farm Bill. Although hemp and marijuana are both varieties of the *Cannabis sativa* plant, the 2018 statute differentiated hemp from marijuana based on chemical composition—specifically the amount of tetrahydrocannabinol (THC) present in the sample.[1]

THC and cannabidiol (CBD) are the most common cannabinoids found in marijuana and hemp; hemp generally contains low amounts of THC and high amounts of CBD, while marijuana generally contains high amounts of THC and low amounts of CBD. According to the new federal statute, cannabis containing 0.3 percent or less of THC is hemp, and cannabis containing more than 0.3 percent of THC is marijuana.[2] This action legally declassified hemp as a Schedule I drug substance.

Before the 2018 Farm Bill, the mere presence of THC in seized cannabis was sufficient to label it a controlled substance. Now that the bill has been signed into law, crime laboratories must figure out how to differentiate seized cannabis samples as either hemp or marijuana despite a lack of reliable methods to measure the quantity of THC in a sample, particularly at the low level specified by law.

HEMP PRODUCTS CASE STUDY

The National Institute of Justice (NIJ) funded the National Institute of Standards and Technology (NIST) to develop and validate extraction protocols and analytical methods to measure the amounts of THC, tetrahydrocannabinolic acid (THCA), and total decarboxylated THC in plant material. The NIST researchers procured 53 hemp samples in plant form from five different commercial online sources. The online hemp vendor websites included a general declarative statement indicating that their products are hemp as defined under federal law. The statements disclose, "All products contain less than 0.3 percent THC" or, similarly, "Products are lab tested to ensure their THC content is less than 0.3 percent."

Researchers screened the samples for THC-related compounds using a thoroughly evaluated and peer-reviewed extraction procedure combined with a liquid chromatography photodiode array method for the analysis of cannabis plant samples.[3] The method essentially separates the different chemicals in a sample and displays them visually as chromatograms, which can then be compared to the chromatograms of known standards.[4] The amplitude of the peaks in the chromatograms can be used to calculate the amount of the chemical found in the total sample (Figure 1).

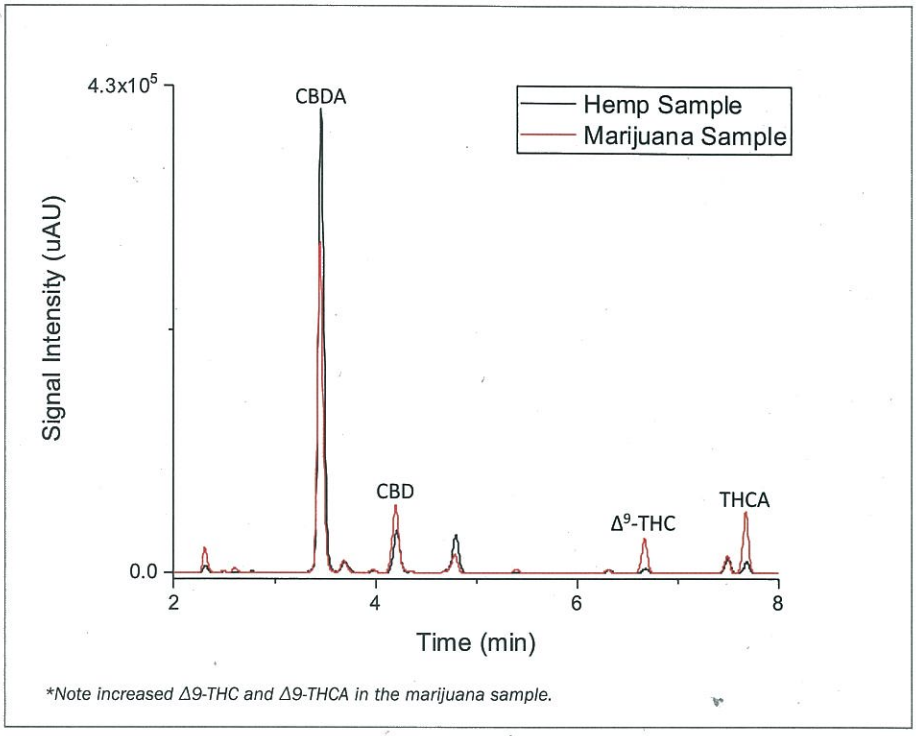
Analyses indicated that of the 53 samples examined, 49 were incorrectly labeled as hemp because they technically fit the federal classification of marijuana (Figure 2). Of the 34 "hemp" samples obtained from Vendor 1, only two fit the federal classification of hemp as determined by total THC; the remaining 32 samples fit the federal

The opinions, findings, conclusions, and recommendations expressed in this publication are those of the authors and do not necessarily reflect the official position or policies of the U.S. Department of Justice.

classification of marijuana.[5] Of the eight samples from Vendors 2 and 3, none of the "hemp" samples examined should be classified as hemp—all should technically be marijuana. And of the 11 "hemp" samples examined from Vendors 4 and 5, only two samples fit the federal classification for hemp, while nine were technically marijuana. Of the inaccurately labeled samples, virtually all had total THC concentrations under 1 percent but above the legal threshold of 0.3 percent.

Although these results cannot be taken as indicative of the entire field of commercial hemp products, they validate the notion that at least some products that are marketed as hemp (and appear official and reliable from a scientific point of view) can be legally classified as marijuana.[6] These products pose a particular challenge for labs attempting to quantify small amounts of THC, as well as consumers who may be unaware of what is contained in the product.

FIGURE 1: CHROMATOGRAMS OF CANNABINOIDS IN MARIJUANA AND HEMP SAMPLES



**Note increased Δ9-THC and Δ9-THCA in the marijuana sample.*

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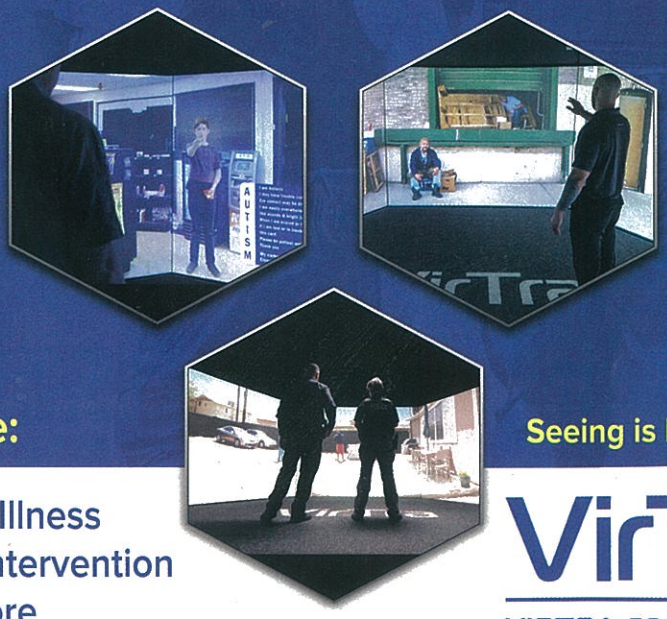

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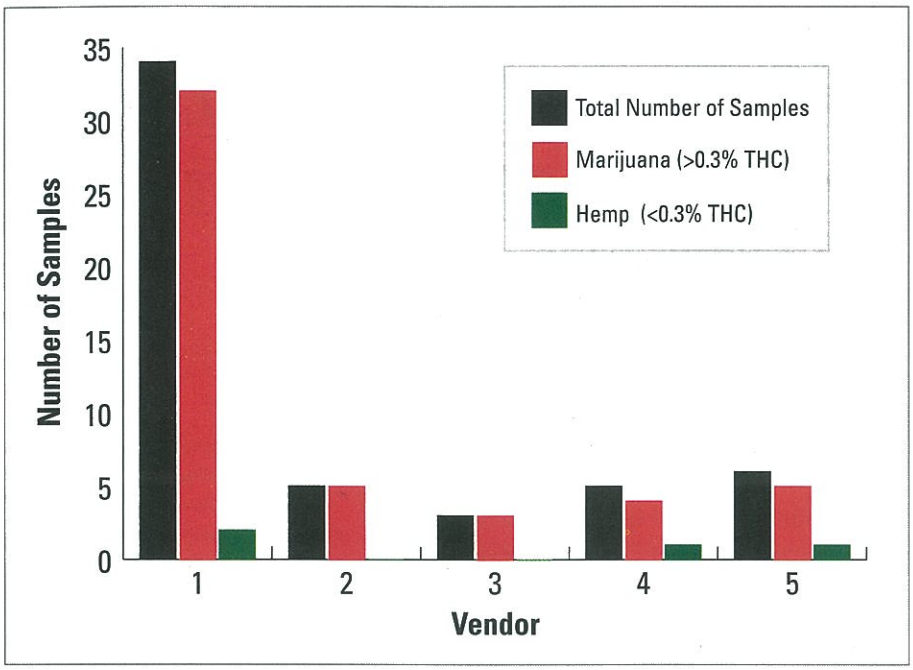
FIGURE 2: ANALYSES OF SAMPLES LABELED "HEMP"



Anecdotally, a Maryland crime lab has also found that many "hemp" samples they have received for testing were found to be legally classifiable as marijuana.

RELEVANCE TO CURRENT LAW ENFORCEMENT EFFORTS

Where does the new law leave us? Many states are in a sort of limbo, where hemp is legal but psychoactive marijuana is not. In direct conflict with federal law, as of February 2022, the medical use of cannabis with high amounts of THC is considered legal in 37 states and the District of Columbia, and the recreational use of cannabis and THC is legal in 19 states and the District of Columbia. In the remaining states where marijuana is still considered unlawful or in states with strong marijuana black markets, local police departments are grappling with how to analyze cannabis samples and distinguish hemp from marijuana.[7]

It is easy to imagine a scenario where a law enforcement officer pulls someone over for suspected driving under the influence of drugs, and with probable cause, they search the vehicle and find a sample of suspected cannabis in the car. Some law enforcement agencies have the ability to use field tests to test for the *presence* of THC, but no field test currently exists that can accurately measure the *amount* of THC in a sample.

NOTES:

[1]THC here refers to Δ9-tetrahydrocannabinol, CBD is cannabidiol, and THCA is tetrahydrocannabinolic acid.

[2]In scientific terms, to find the "delta-9 tetrahydrocannabinol concentration…on a dry weight basis" as stated in the statute, it is necessary to consider both the Δ9-THC concentration as well as the concentration of THCA.

[3]Walter B. Wilson and Maryam Abdur-Rahman "Determination of 11 Cannabinoids in Hemp Plant and Oils by Liquid Chromatography and Photodiode Array Detection," *Chromatographia* 5 (2022): 115–125.

[4]A chromatogram is a graphical representation of the concentration of a substance found by a detector.

[5]Hemp: a total decarboxylated Δ9-THC content less than or equal to 0.3 percent, marijuana: a total decarboxylated Δ9-THC content greater than 0.3 percent (they were predominantly less than 1 percent total THC).

[6]An in-depth publication with more extensive details is in preparation.

[7]National Conference of State Legislatures, "State Medical Cannabis Laws," July 18, 2022. It should be noted that even in states where the recreational use of marijuana is legal, there are cases where it is necessary to determine whether a seized substance is hemp or marijuana, such as for underage possession.

[8]This research is ongoing and will expand to include additional samples from other sources, as well as other products besides plants, such as oils, vape liquids, and edibles.

ACTION ITEMS

Since many states are moving toward decriminalizing marijuana, the need to be able to accurately measure the amount of THC in a cannabis product may be more of a problem in those jurisdictions in which it remains unlawful. There are, however, some things that police chiefs can do right now to address some of the complex issues around hemp and marijuana.

- Understand that individuals can exhibit the effects of being under the influence of marijuana from products not marketed as such.
- Alert personnel in law enforcement, probation and parole, and juvenile justice about the possibility of product mislabeling and how it may affect those on parole in possession of a potentially inaccurately labeled product. Forensic laboratories with the ability to accurately measure levels of THC in plant and other products (such as gummies and vape oils) can help shed light on how widespread this problem might be.[8]
- Reach out to city managers, mayors, and other elected officials to raise awareness of the issue.
- Develop relationships with their local crime labs to understand the policies around marijuana testing.
- Seek private or federal funding for forensic lab infrastructure that could assist the team and help with the development of improved hemp and marijuana differentiation methods.
- Increase awareness and training for officers so they are aware of the assumptions they may have when making arrests and the possible implications for the way suspects are prosecuted.