B78 Differentiation of Seized Marijuana Samples Using Automated Headspace/Solid-Phase Microextraction Coupled to Gas Chromatograph/Mass Spectrometer/Flame Ionization Detector (HS/SPME-GC/MS/FID) and Principal Component Analysis (PCA)

Jessica Winborn, BS, 2405B FM 1375, E, Huntsville, TX 77340; James D. Sweet, PhD, U.S. Customs and Border Protection, LSSD, 4150 Interwood S Parkway, Houston, TX 77032; and Jorn Chi-Chung Yu, PhD, Sam Houston State University, Dept of Forensic Science, Box 2525, Huntsville, TX 77341*

After attending this presentation, attendees will better understand automated HS/SPME-GC/MS/FID methodology and its application to the differentiation of different marijuana samples.

This presentation will impact the forensic science community by providing an automated method for the differentiation of different marijuana seizures. This presentation will enhance the applicability of HS/SPME-GC/MS/FID to controlled substance analysis and allow agencies to gather intelligence about drug distribution networks.

The term marijuana refers to the plant material (mostly leaves and buds) of *Cannabis sativa* L. There are more than 60 natural cannabinoids found in marijuana. The primary psychoactive component is Δ9-Tetrahydrocannabinol (Δ9-THC). Marijuana is federally a Schedule I controlled substance, but on a state level it ranges from fully illegal to fully legal. The change in legislation has raised new concerns for law enforcement. One of these concerns is whether legally grown marijuana is being diverted out of states where it is legal for recreational use to ones in which it is illegal. The ability to track the flow of marijuana to and within different jurisdictions will be an important tool for law enforcement officials.

In this study, an HS/SPME-GC/MS/FID method has been applied to seized marijuana samples to analyze their cannabinoid profile in order to assess common origin between seizures. The plant material was ground and sieved before being weighed out into sample vials. The vials were placed on a GC/MS autosampler that would carry out the HS/SPME extraction using a Polydimethylsiloxane (PDMS), 23 gauge, 100µm absorbent fiber and the extracted sample was injected into the GC/MS. The extraction temperature for cannabinoids was 150°C and the optimal extraction time was five minutes. Regeneration of the PDMS fiber was achieved by heating the fiber to 250°C in the autosampler conditioning chamber during the run after the fiber was exposed to the inlet of the GC/MS. The resulting cannabinoid profiles for each seizure of marijuana were analyzed using Principal Component Analysis (PCA) to assess the differences between them.

Results from this study show the analysis of cannabinoid profiles using HS/SPME-GC/MS and PCA to have great potential for being able to differentiate different marijuana samples. One of the seizures used in this study was differentiated from the other two. The remaining two seizures showed overlap between them. Future research will include the analysis of other non-cannabinoids present in the chemical profile of marijuana samples to improve the discriminatory power of this method.

Marijuana, HS/SPME, Principal Component Analysis

*Presenting Author