B97 What's That Lingering Smell? An Evaluation of Residual Decomposition Odor Volatiles in Colombian Territory

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Learning Overview: After attending this presentation, attendees will better understand the Volatile Organic Compounds (VOCs) emitted after decomposed porcine remains have been removed from soil. Examining the quality and quantity of residual decomposition odor over time helps to address search and recovery methods of victim remains cases that Colombian law enforcement commonly encounter.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by aiding in the knowledge and understanding of volatile odor patterns from residual decomposition odor sources at various decomposition times, support locating holding sites, and possible modes of transportation.

In 2019, Colombia averaged 32.8 homicides a day and many of these cases remain unsolved due to lack of evidence. By furthering the understanding of decomposition changes as measured by VOC profiles over time in soil matrices, enhanced methods can be developed to discover dump sites that can aid in a forensic investigation. To maximize the evidence recovered in crime scene response operational scenarios, human remains detection canines need to be trained to a variety of decomposition odor changes, including residual odor instances where the actual cadaver may have been removed from the search site. Currently, there is limited scientific research into how decomposition compounds change as a function of contact time between the decomposing substrate and the deposition environment. Emerging research has begun to look into the compounds present in soil during decomposition, but none are specifically looking at the quality and quantity of the volatile odor pattern over time, after the removal of the decomposing odor source, in a tropical, high altitude region such as Colombia.

This study provides novel data to generate a decomposition odor sequence using Solid Phase Microextraction-Gas Chromatography/Mass Spectrometry (SPME-GC/MS) as a rapid system for the analysis of headspace odor volatiles. Instrumental evaluation utilized Divinylbenzene/ Carbon/Polydimethylsiloxane (DVB/CAR/PDMS) -coated SPME fibers that were injected into a GC/MS system for the identification of extracted volatile odor profiles from the soil. The sample collection process consisted of allowing pigs to decompose for a period of 24 hours, 72 hours, 120 hours, and 30 days, then removing the pig and sampling the soil. The soil samples were sampled individually in 10mL glass vials, shipped on dry ice and allowed a period of 24 hours for headspace equilibration, then extracted via SPME methodology. Weather conditions such as temperature and humidity were recorded during each soil sample collection, as well as the pH and moisture content of the soil sample matrix. The findings include an assortment of VOCs emitted from each set interval, each interval exhibiting distinct odor profiles depending on the surface contact time of the decomposing odor source before removal of the pig. The benefit produced by the study has heightened the understanding of how residual decomposition odor changes over a set period of time in a tropical, high-altitude environment. This research will ultimately aid in the knowledge and understanding of volatile odor patterns from residual decomposition odor sources at various decomposition times, which will support in locating holding sites and possible modes of transportation.

Volatile Organic Compounds, Residual Odor, Soil

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