G109 Can Lucilia Sericata Change Gravesoil Microbial Community Structure?

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After attending this presentation, attendees will understand that there is potential in using fatty acids to characterize gravesoil microbial community with the ultimate goal of estimating postmortem interval (PMI). Attendees will also understand the effect of the blowfly Lucilia sericata on gravesoil microbial community structure.

This presentation will impact the forensic science community by the development of an additional method to determine extended PMI and increasing the understanding of cadaver decomposition. This knowledge can be used in conjunction with other methods to estimate PMI, such as forensic entomology.

Death investigations heavily rely on accurate estimations of PMI to assist in identification of victims and suspects as well as determining the validity of alibis. Currently, the most reliable method to estimate PMI at an outdoor death scene is forensic entomology. In cases where active blowfly larvae have already migrated away from the body, estimating PMI becomes difficult.

A controlled laboratory experiment was conducted to determine if the presence of the blowfly *Lucilia sericata* (Diptera: Calliphoridae) can affect the structure of the gravesoil microbial community. To do this Petri dishes were placed (150 mm x 25 mm) filled with 150 grams (g) of washed sea sand inoculated with 150 g of Pawnee clay loam soil in growth chambers. Soil was collected from Nine Mile Prairie, a natural tall-grass prairie ecosystem, which is located approximately nine miles northwest of Lincoln, Nebraska. Inoculated soil was calibrated to a water holding capacity of 55% and left to equilibrate for seven days in growth chambers.

A mouse carcass (killed with carbon dioxide) was then placed on its left side on the inoculated sand within 30 minutes of death. Fly eggs (10 per carcass) were counted and placed on the right eye of selected carcasses shortly after placement on soil and were monitored daily to prevent desiccation.

The temperature was kept at approximately 22°C during the experimental period and the water content of the inoculated sand was maintained at 55% every 3-4 days by adding distilled water. Carcass decomposition was monitored every 24 hours for 35 days using a decomposition scoring system. In addition, carcass mass loss was measured at 7, 14, 21, 28, and 35 days postmortem. A destructive harvest design was used to avoid the influence of carcass disturbance on the rate of decomposition. Following carcass harvest, inoculated sand was collected and analyzed for lipid phosphorus, fatty acid methyl esters, pH, and electrical conductivity. This experiment was replicated four times and controls (inoculated sand with no carcass) were used.

Results indicated that overall, carcass treatment had minimal effect on mass loss. There was no significant difference ($P = 0.058$) between the treatments, however the overall percent of mass loss between treatments varied. Mass loss of carcasses on Petri dishes reached approximately 35% ± 3.38 of total body weight after 35 days, carcass on soil reached approximately 62% ± 5.80, and carcasses on soil with insects reached approximately 60% ± 5.44. A higher total body score was observed for carcasses on soil with insects than carcasses on soil, which were both higher in total body score than carcasses on Petri dishes. The highest possible total body score for all treatments was 21. Carcasses associated with insects had only their face consumed and therefore it was observed that the remainder of the body decomposed in a similar fashion to carcasses on soil not associated with insects. Lipid phosphorous analysis indicated that soil associated with carcasses had a much greater total microbial biomass than control soils. There was no significant difference between gravesoils regarding the presence or absence of insects for this analysis. Results from the analysis of fatty acid methyl esters will be presented.

Forensic Taphonomy, Extended Postmortem Interval, Ecology

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