G158 Insect Repellent and Insecticide Effects on Adult Insect Activity at Carrion in Northern Virginia

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After attending this presentation, attendees will better understand the potential effects of insect repellents and insecticides on insect activity at carrion and, consequently, on the estimation of a Postmortem Interval (PMI) for human remains by a forensic entomologist. A comparison of the effects of two insect repellents and one insecticide on diptera and coleoptera activity on carrion and relative decomposition of that carrion will be presented.

This presentation will impact the forensic science community by raising awareness of the potential impact the presence of insect repellents and/or insecticides may have on insect activity associated with carrion. Understanding the potential influence such chemicals may have on insect activity and, in turn, decomposition, will be useful to forensic entomologists and the law enforcement community when estimating a PMI. Without understanding the ultimate effects insect repellents and/or insecticides may have, it is possible an approximation of time since death may be under- or over-estimated.

Many factors influence detection and colonization of carrion by necrophagous insects; some factors may accelerate, slow, or even act as barriers to insect activity. Some potential barriers to necrophagous insect activity are natural, man-imposed physical barriers, and man-imposed chemical barriers. This research study addressed three different man-imposed chemical barriers: two insect repellents (a natural oil-based repellent called EcoSmart and a 99% N,N-diethyl-3-methylbenzamide or DEET® spray and one insecticide (Raid®).

In this study, eight skinned, frozen rabbits were utilized. All eight rabbit specimens were of roughly the same size and weight. The specimens were secured inside cages and placed approximately six meters apart on a grassy residential lawn. The chemicals used in this study were EcoSmart®, DEET® spray, and Raid®. Two test groups were utilized: Group A and Group B. Group A tested the effects of the repellents and insecticide in open space. Group B tested the effects of the same three chemicals; however, the rabbit specimens were loosely covered in plastic. For each rabbit specimen in Group B, the outside layer of the plastic was sprayed with each of the three chemicals. All tests were run simultaneously, ensuring equal exposure to temperature changes, minimizing the variables affecting the results. The experiment was structured to test the effect of each chemical by comparing the number of adult flies and adult beetles collected next to each specimen by day. Collection of adult insects was facilitated by the use of sticky rodent traps. Only adult insects from the Diptera and Coleoptera orders were counted. The insects were identified only to order versus down to species and the identification was made visually for the purposes of counting total numbers of adult flies and beetles. Data analysis was conducted utilizing a quantitative versus a qualitative method. The collected data, namely numbers of flies and beetles by each specimen on each day of the experiment, was subsequently utilized to calculate mean values and standard deviation. Mean and standard deviation were calculated for each rabbit specimen by day, group, type of insect, and combined insect count.

Based on the comparison of the collected data to the normal standard deviation range, significant results were identified for specimens treated with DEET® and Raid® in both groups.

This experiment was successful in demonstrating that DEET® and Raid® can have a significant effect on adult insect activity on carrion and, therefore, may affect the rate of decomposition. While some killers may apply methods to accelerate the rate of decomposition or to prevent a body from being found or recognized right away, altering the rate of decomposition through the application of insect repellents or insecticides could also have a significant impact on investigations. Delayed insect activity on a body could make it appear as if the body has been decomposing for a shorter amount of time than it actually has, thus possibly leading to an inaccurate time frame for events leading up to the discovery of human remains. Further studies are required to test the effect of different insecticides and insect repellents, specifically on necrophagous insect activity. Such studies would greatly benefit investigators and forensic entomologists when an accurate estimation of a minimum postmortem interval (mPMI) and a Period of Insect Activity (PIA) are needed.

Forensic Entomology, Insect Repellents, Insecticides

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