

Effectiveness of Homemade Fly Traps vs. Commercial Fly Traps on *Musca domestica* (Diptera: Muscidae)

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Abstract: There are many different traps that have been used to trap insects such as flies and can aide in providing evidence such as time of death of a decedent or narrow down a geographic region. This makes flies very important in the forensic science world. The use of different flytraps is also beneficial to the public when it comes to knowing which ones to use. *Musca domestica* (Linnaeus) (Diptera: Muscidae) is an extremely common species of fly and there are various types of fly traps available. In this study, the researchers tested the effectiveness of homemade fly traps versus commercial fly traps and found that commercial fly traps were more effective based on the results.

Key words: fly traps, houseflies, *Musca domestica*

At times, insects can provide crucial evidence to help solve cases. For example, forensic entomologists were asked to look into an unsolved murder case 50 years later. The evidence and testimony they presented changed the original time of death calculations, resulting in an acquittal of the man who had originally been convicted and been serving time in prison (VanLaerhoven and Merritt 2019). Because flies can provide so much useful information in an investigation, the use of small bait traps has become common and many researchers have found them to be a useful tool for forensics entomology investigations (Sanford 2017, Farinha et. al 2014, Prado et al. 2012). The data from small bait traps “can help criminal investigations in the identification of the species collected from the cadaver, human or animal, in indicating correct times of oviposition, and also signaling the original

location of a crime” (Farinha et al. 2014). However, not all researchers agree. A recent study by LeBlanc et al. noted that while small bait traps do have value as a tool to “document the communities of necrophagous Diptera in a given area” (2021), the species compositions were different between small bait traps and the actual remains. Therefore, caution should be used when the data from small bait traps is used in court (LeBlanc et al. 2021).

The existing research on this topic shows varying results as to which types of fly traps are most effective. Burditt (1988) found that a homemade fly trap caught the most of one particular species, but caught very few other species in Washington. Geden (2009) tested which type of commercial trap was most effective on Florida dairy farms and discovered that field made traps did not

perform well until the tops were painted black. Despite many researchers finding that the color of traps helps with attracting flies, Hanley et al. (2009) did not find a significant difference between various colors of fly traps. As the researchers pointed out, this could be explained by field conditions that could lessen the attractant properties that were usually present in laboratory settings (Hanley et al. 2009).

The following research question will guide this study: Are homemade fly traps as effective as commercial fly traps for forensic entomology?

Materials and Methods

Experimental Location and Timeframe

Three locations were selected in the central Texas town of Reagan, Texas as the experimentation sites. The following locations were chosen: a local family sheep ranch, the backyard of a residence, and a pasture. These locations were selected because they are within close proximity to one another, all being within a 1.5-mile radius yet they represent various settings in which the study could be replicated. The sheep ranch is home to approximately 200 head of sheep and has a barn, along with a pasture containing grass and trees. This contrasts with the second site, which is the backyard of a residence and consists of a single-family home with a lawn that is cut regularly, a few trees, flower beds, and a small garden. The third site, a pasture, is currently housing horses, but often has cattle as well. It is approximately 20 acres of land that is undeveloped and contains a stock tank

as a water source for the livestock and some scattered trees.

Materials

The experiment consisted of each of four traps at each of the three experimentation sites--one commercial fly trap and two homemade fly traps, as well as a control trap. The commercial fly trap for each location was the Victor M380 Fly Magnet 1-Quart reusable trap with bait (Woodstream, Lancaster, PA). The homemade traps at each site were made using the same method, but filled with different bait. (A) The top was cut off of an empty two-liter plastic bottle and the plastic lid of the bottle was removed. (B) The bottom of the bottle was filled with bait. (C) The top part of the bottle was placed upside down into the bottom part to create a funnel. One homemade trap contained a syrup made from two cups water and 4 tablespoons of sugar. The second homemade trap contained enough very ripe apple chunks to form a thin layer on the bottom of the bottle, along with two cups of white vinegar. The control trap at each site was made using the same method as the homemade traps, but contained two cups of tap water instead of bait.

Experimental Design

The research took place across the three sites concurrently, during a one-week time period. The traps were placed three feet apart and placed under a covered area to protect them from the elements. On day seven, the traps were checked and emptied with flies collected and counted by the researchers. *Musca domestica* (Linnaeus) (Muscidae: Diptera), also known as the housefly, is extremely common in the central Texas area

where the research took place. Because *M. domestica* is the most common insect present in these locations, the researchers focused on this type of fly for the purposes of this study. Any other species or flies or various insects that were trapped were discarded and not counted in the results.

Results

A total of 904 *M. domestica* were caught from all three locations, with most being

trapped at the sheep ranch. Among the three locations, there were an average of 165 caught with the Victor M380 Fly Magnet, which is the commercial trap. There were an average of 79 flies caught with the homemade trap using fruit, 26 flies caught with the homemade trap using syrup, and 8 flies caught in the control trap using only water. Figure 1 depicts the number of flies associated with each type of fly trap for all three locations.

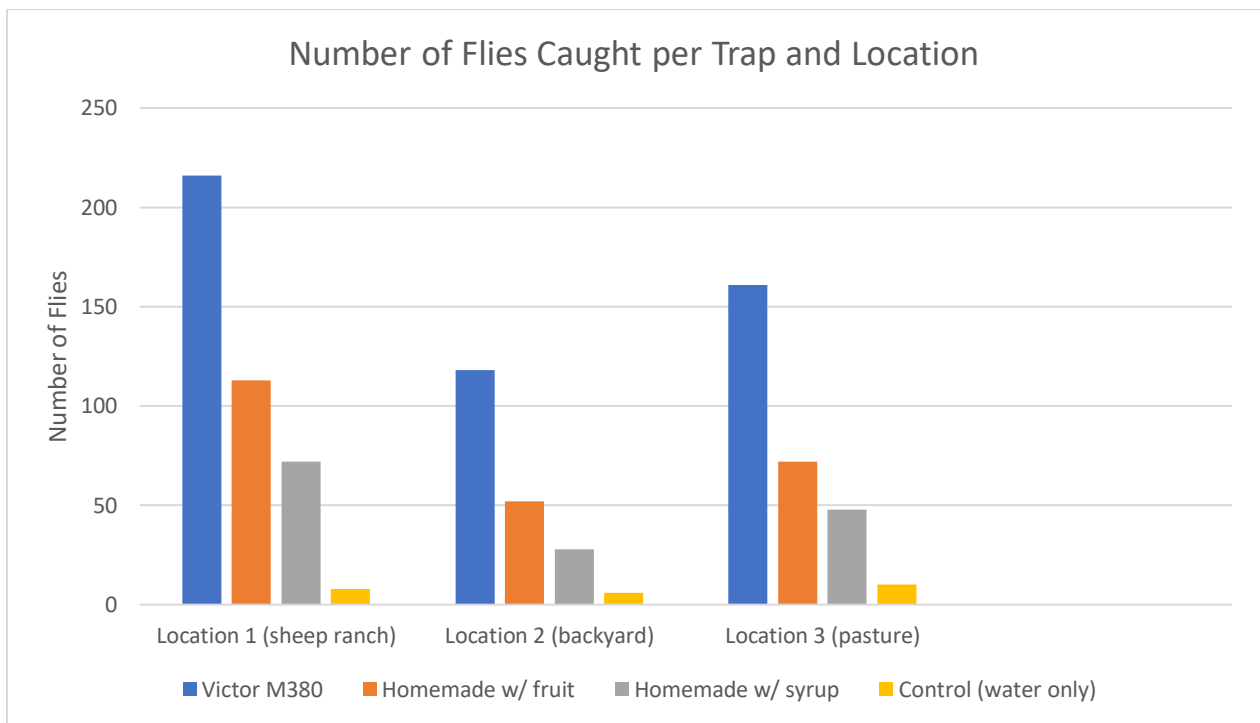


Figure 1. Number of flies caught per trap and location.

Discussion

The research confirmed that fly traps are effective in catching *M. domestica* specimen, this information could be used in forensic entomology to replicate conditions and aide in determining time of death and geographic location of a crime. In this study, the

commercial fly trap proved to be more effective than homemade traps. However, homemade traps can be made with a variety of substances and using various baits such as raw meat could change the outcome. These results can also benefit the public when it

comes to picking flytraps to put up around the house or in a barn of some sort. If commercial fly traps are not available, a homemade trap could be used in the meantime, although the results won't be as good as commercial fly traps, there would still be less flies. There are some errors that could have contributed to the experiment though; the weather could have contributed to the number of *M. domestica*

caught in each type of trap, as this study was conducted in the fall with Texas temperatures ranging during the week of the experiment. Although the study was replicated in three different locations simultaneously, conducting the experiment during the summer and in various geographic regions may result in more generalizable results, giving a better set of data and understanding.

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