

Autumn Greer Blow Fly Attraction

Abstract

Finding suitable oviposition sites is based on visual and olfactory for blow flies. Previous research has analyzed the visual and antennal sensory receptors. This experiment looks at testing different colors of Listerine and DIY repellents using *Phormia regina* and *Lucilla sericata*. Yellow and blue had the highest mean number of flies attracted to it.

Introduction

Blow flies operate under two cues to find a suitable oviposition site. These are visual and olfactory. There has been previous research has been done in the 60s and 70s documenting blow flies' antennal sensory receptors to chemical compounds [3, 9]. The latest research has been done identifying the specific genes that are triggered when exposed certain compounds [6, 8].

Color vision within insects was first described 100 years ago by a German scientist named Karl von Frisch. He worked with honeybees and eventually taught them to recognize and distinguish color. Through his research we have been able to determine other species visual spectrums. A study published by Harvard identified that flies visual color spectrum starts at roughly the yellow wavelength and ends at the blue wavelength, although flies can see into the UV light spectrum [4]. Blow flies tend to gravitate toward yellow and blue since these are the colors that they can see the best in our visual color spectrum. Research has found that blue is a fly's favorite color. Given the choice flies will choose blue [10]. A study produced the University of Florida, created fly traps that were blue based on this principle claiming that yellow traps repelled more flies than it caught [2].

This experiment was broken into two parts. The first part was looking into DIY repellents. The second part was testing different colors of Listerine. The DIY repellents used *Phormia regina* and *Lucilla sericata* to test two substances commonly found in DIY repellents and a mix of the two as a common DIY fly repellent for horses [7]. Flies would be repulsed by substances although they would be attracted by the colors. The Listerine colors used only *Lucilla sericata* to test the theory presented by the University of Florida. Flies would be more attracted to the Listerine colors with alcohol than within out.

Methods

Blow fly setup and care

To start the experiment, a cage of the flies needed to be set up. In a large cage with adult flies, place 5 sugar cubes and a water container. For gravid females, add a milk paste and liver. After the females had laid eggs on the liver, they were transferred to a wide mouth jar with pine shavings cover with mulch tarp and secure with band lid of the jar. Once the eggs hatched, the maggots were monitored, and liver was added about once a week. After the maggots pupated, the newly emerged adults were placed in the freezer to cold sedate and transferred to the smaller experiment cages.

DIY Attractions

P. regina was reared out to fourth generation. Newly hatched flies were cold sedated and transferred to four 1 ft x 1 ft cages consisting of 20 males and 40 females. Each cage had sugar and water over the course of the experiment. Added to each cage was 118.29 ml of yellow Listerine, 118.29 ml of Downy Amber Blossom fabric softener, 118.29 ml of equal parts Listerine and fabric softener mix, and 118.29 ml of water in modified plastic water bottles. After 72 hours, the bottles were removed from

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the cages and separated into males and females. The numbers were recorded. Repeat the experiment with *L. sericata*.

Listerine Colors

The process to set up the cages was the same as the DIY attractions. Added to each cage was 118.29 ml of the original yellow Listerine, 118.29 ml of the citrus orange Listerine, 118.29 ml of the cool mint zero alcohol blue Listerine, and 118.29 ml of the fresh mint zero alcohol purple Listerine. After 72 hours, the bottles were removed from the cages and separated into males and females. The numbers were recorded.

Results

P. regina

Listerine and Downy had the highest mean number of flies collected. The Listerine + Downy mix had a lower mean number than just the Listerine or Downy. The lowest mean was water. The males and females were comparable, except for the Listerine which had a higher mean number of females.

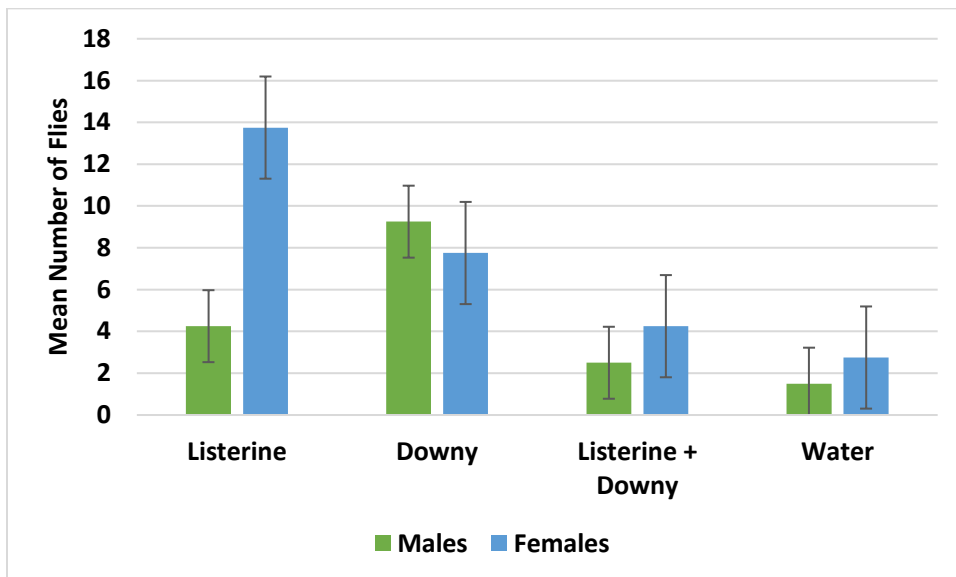


Figure 1. Mean number of *P. regina*

L. sericata

The highest mean was water. Listerine had the second highest mean. Downy had the third highest mean. The Listerine + Downy mix had the lowest mean number. Listerine, Downy, and water had a higher mean number of females to males.

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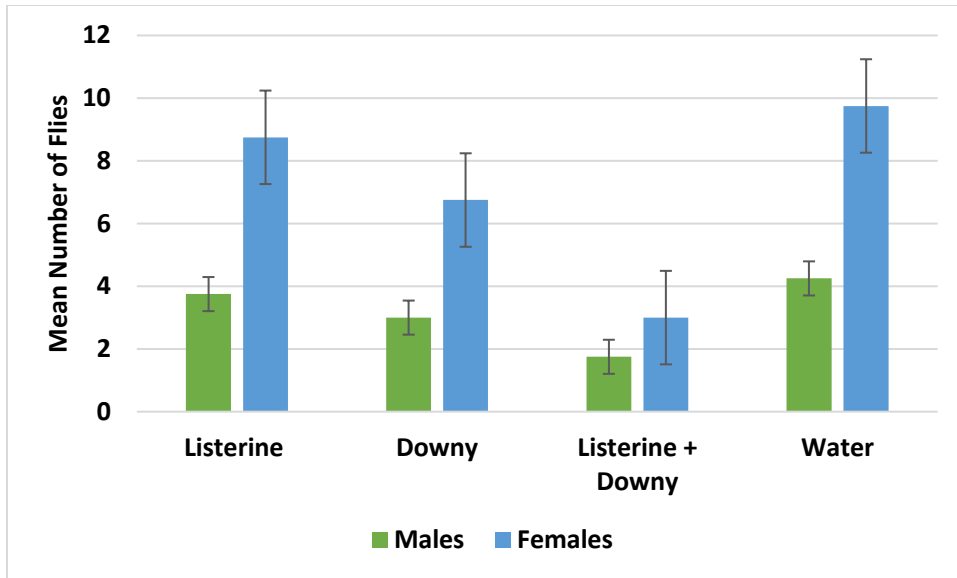


Figure 2. Mean number of *L. sericata*

Listerine Colors

The yellow and blue Listerine had the same highest mean number. The purple Listerine had the lowest. The yellow and blue were had a higher mean than the orange and purple.

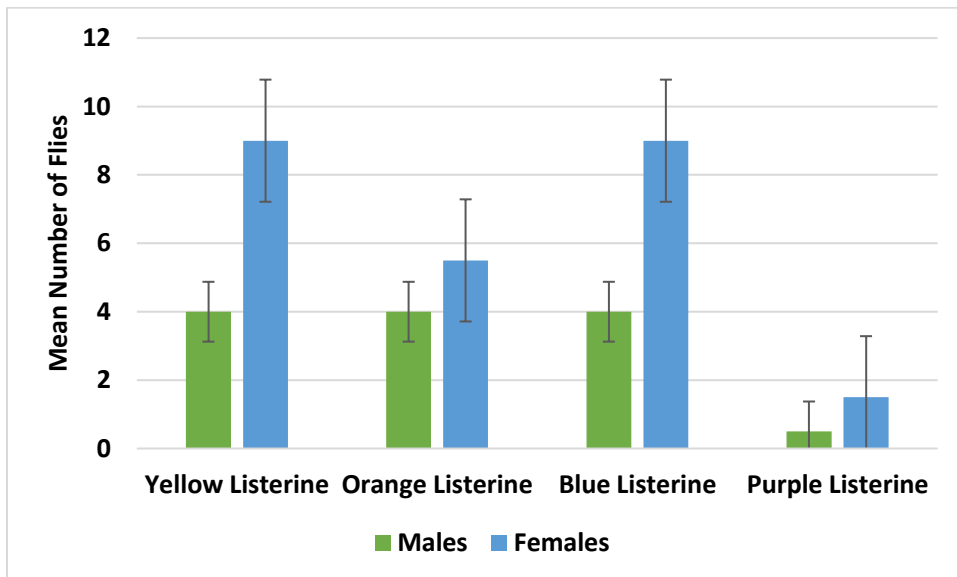


Figure 3. Mean number of *L. sericata* for Listerine color trial

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Discussion

In both experiments, yellow and blue were the primary colors that attracted the flies. The Listerine and Downy mix had the lowest number of flies over both trials. The DIY repellent was not effective at repelling the flies completely. Some flies were still attracted to it. My hypothesis was incorrect because the flies were not repelled by any of the substances.

In the Listerine colors trial, alcohol did not appear to make much difference in terms of the flies' attraction to the colors yellow and blue. However, there was a higher overall number of flies that were attracted to the colors with alcohol, yellow and orange, as opposed to the ones without, blue and purple. This makes sense because alcohol is a by-product given off during decomposition. The purple Listerine had the least number of flies. I believe this is due the purple being just outside the preservable visual color spectrum. My hypothesis was correct as I figured the Listerines containing the alcohols would draw in the greatest number of flies, specifically the females.

One of the differences between *P. regina* and *L. sericata* was that *L. sericata* had higher number of flies that went to the water. There are two possible reasons why this happened. The first being the flies were attracted to the iron in the water. Iron is a large part of what makes up blood. The second could be that the flies used for this experiment were older in their life cycle compared to *P. regina*. The Listerine experiment was only done using *L. sericata* because the *P. regina* colony had collapsed. Only two cages were done in this experiment as well due to the limited number of *L. sericata*.

In the future, I would test the Listerine colors with more cages as well as with *P. regina* to be able to compare the results. I want to run an olfactory volatile profile analysis. I would like to test these experiments with some different species and different household products. I would also like to take this line of research to a field study to determine if these attractants or repellants would have any effect compared to decomposition.

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