Mosquito Attraction Research

By: Dominic Lampo, Eitan Benzaquen, Andrew Quintana, Karim Elyouseff, Ethan Arroyo

ABSTRACT

Mosquitoes in recent years have increased greatly in numbers due to the rapidly changing climate and rising temperatures. With this change comes suitable habitats for mosquitoes which are the most efficient killers in all of the animal kingdom due to the number of deaths from mosquito-borne diseases. If we were able to pinpoint the certain areas that mosquitoes are most attracted to we could in theory slow or even prevent the spread of mosquitoes. In our project, the research was conducted to find a correlation between the color and size of the traps to the amount of mosquitos that are present. With our findings, we were able to conclude that the bigger the traps, the faster the mosquitoes would be attracted to that area. We also found that the different size traps would hold similar densities of mosquito larvae per square inch.

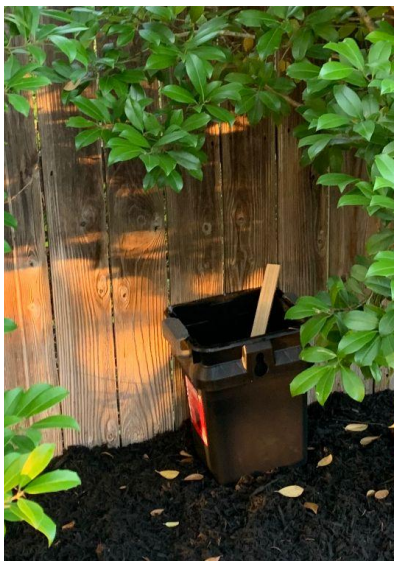
INTRODUCTION

With a rapidly changing climate and rising temperatures, we are experiencing an increase in the mosquito population. This is becoming a more relevant issue because of the deeming threat of mosquito-borne illness, especially to those in undeveloped countries. If we were able to pinpoint the certain areas that mosquitoes are most attracted to, we could in theory slow or even prevent the spread of mosquitoes. In our project, we explored the following research question: “Do the color and surface area of mosquito traps have an effect on the trap’s ability to attract mosquitoes?” We hypothesized that the density of mosquitoes in our traps would be proportional to their respective surface areas. We also thought the darker color traps would attract the egg-bearing mosquitoes faster.

RESEARCH METHODS

To examine the correlation between the color and size of the traps to the amount of mosquitos present, we initially used 3 traps of 3 different sizes and set them up in different locations but with similar land cover (i.e. next to a tree or bush in a shaded area away from direct sunlight, see Figure 1). The first trap was a small paint bucket that had a surface area of $28in^2$. The second trap was a “medium-sized” bucket with a surface area of $100in^2$. The third trap was the largest, with a surface area of $600in^2$. To isolate the influence color has on mosquito attraction, we used another set of 3 buckets, all the same size, placed in similar land cover. One bucket was white, one was blue, and one was black. All buckets were filled with outside tap water. Fish flakes were used as bait. Every two days for a week, the traps were checked for larvae.

Figure 1: This is a picture of the medium-sized trap (Surface area: 100in^2) in shade.



When the larvae were found, looking down on the traps, we took a picture of the larvae. The picture was then split into 16 sections to make counting easier as it was all done by hand (see Figure 2). Once the final count was tallied, we logged into the GLOBE Observer app. Under the Habitat Mapper tab, we reported the land cover, amount of mosquito eggs, larvae (see Figure 3), pupa, and adult mosquitoes found in the trap.

Figure 2: This was a set of 4 sections out of the 16 in the trap

Figure 3: A mosquito larvae captured through a magnified lens.

After a week, we compiled and analyzed the data. The larvae found from each bucket were divided by their appropriate surface area to calculate mosquitoes per square inch (mosquito density).

RESULTS

Larvae Count per Surface Area

	Day 2	Day 4	Day 6
Small (28 in^2)	0	603	416
Medium (100 in^2)	243	1941	676
Large (600 in^2)	204	2743	1834

DISCUSSION

Our hypothesis was supported. The larger surface area attracted more larvae within fewer days than compared to those of the small and medium-sized traps. What is interesting to note is that the small and medium buckets held similar mosquito densities with about 20 larvae per in^2.

As changing weather conditions are not always ideal for prime mosquito breeding, this element did play a role in data collection. The work of collecting data was divided among the group members in 2 different states: Texas and Florida. Unfortunately, researchers in Florida experienced severe weather conditions during the week of testing and were not able to collect data on the color variable. Hopefully, in the near future, we can repeat the study and examine the correlation between color and mosquito attraction.

Out of curiosity, we were interested to see if the color of the water itself played a role in mosquito attraction. In doing some research there was an experiment that studied the effects of dyes in water (Ortiz-Perea et al). This type of dye can be commonly found in many amusements parks and tourist attractions so if mosquitoes are attracted to this color it could become a hazard for people in the area. The study used blue and shadow (a reddish color) dyes and found no significant differences in the number of larva between them, indicating that they are not attractants. In the future, we would like to pair our experiments as they could provide useful insight in what we are studying. By setting multiple traps each with a combination of color, surface area, and water dye we could gain a deeper understanding of mosquito attraction.

CONCLUSIONS

According to our data, we can conclude that a larger surface area attracts more mosquitoes faster but can only hold so many larvae respectively. This information is key to understanding and slowing the spread of mosquitoes. As research continues people will become more informed of the environment around them and learn to keep a watchful eye on these habitats. Habitats include any pool of water, shaded and near vegetation, that becomes havens for mosquitoes. The first step to combating these rapidly spread illnesses is discovering the habitats which attract them. Once these are established, efforts can be made to modify or alter the mosquitos themselves or implement any method necessary for the solution to mosquito-borne illness. This will obviously take time as it is another ongoing experiment but our research remains a bright light for the future.

ACKNOWLEDGMENTS

We would like to give our thanks to NASA, SEES, and the Texas Space Grant Consortium, along with our mentors Rusty Low, Cassie Soeffing, Peder Nelson, and the peer mentors for the opportunity to present our research.

Works Cited

GLOBE Program. (n.d.). *Navigation*. GLOBE.gov. Retrieved December 16, 2021, from https://observer.globe.gov/about/get-the-app

Ortiz-Perea, N., Gander, R., Abbey, O., & Callaghan, A. (2018, March 28). *The effect of pond dyes on oviposition and survival in wild UK Culex mosquitoes*. PLOS ONE. Retrieved December 16, 2021, from https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0193847