



Worms Reaction to Dish Soap Brands

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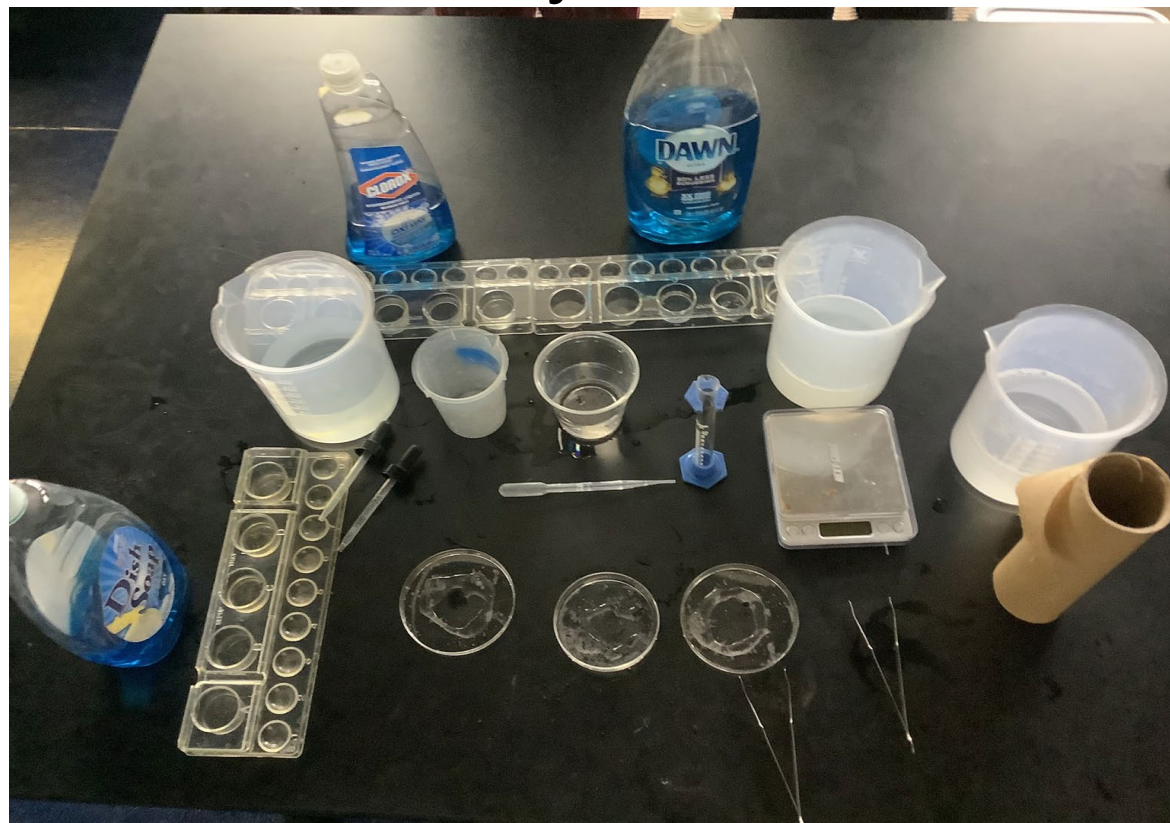


Introduction

“Toxicology is a field of science that helps us understand the harmful effects that chemicals, substances, or situations, can have on people, animals, and the environment.” quote NIHS. Dish soap is a common household cleaner, used to sanitize dishes and items with food residue/grease. We are asking the question; How does differing amounts of water mixed with dish soap effect worms when exposed? While researching we found what levels of dilution would be realistic and that in outdoor events (ex. camping) this water is simply dumped into the nearby soil. Our hypothesis is that all 3 brands of dish soap we will be testing will be toxic and harmful to the worms, however we thought Clorox would be the most toxic due to the fact it was labeled to require barely any scrubbing, and 4x more effective on grease. Homestore Dish Soap would be in the middle, but high up there with Clorox, and the Dawn Ultra soap would be the least as it was labeled it as environmentally friendly.

Materials and Methods

Materials: ≈24 worms, 3 Petri dishes, 1 gram of Dawn dish soap; 1 gram of Homestore dish Soap, 1 gram Clorox Oxi Max dish soap, 1 Gallon of water, 1 syringe for water, 1 chemical dump cup, 1 10 ml beaker, 2 pairs of tweezers, 2 chemical syringes, 3 Sepup chemical mixing tray, 1 roll of paper towel, 1 gram scale, 3 1000 ml beakers, 1 worm recovery chamber.



Procedure: 1. Dilute the three dish soaps to amounts of 1000, 100, 10, & 1 ppm using the 1000 ml beakers, chemical syringes, gram scale, & dish soaps.

2. Create a worm recovery chamber using a medium sized container, placing a wet paper towel in it.

3. Begin testing by placing a worm in the middle of each Petri dish, and create a circle of solution around the worm. If the worm has no reaction and is fine with the solution, mark it as no reaction. If the worm consistently moves away from the solution and recoils and tries to get away, mark the result as mild reaction. If the worm rapidly contracts and expands (possibly jumping) when touched by solution, mark the result as a strong reaction.

4. Perform 3 tests for each solution, placing water in Petri dish and worm, dry it off, and place worm in recovery chamber.

Results

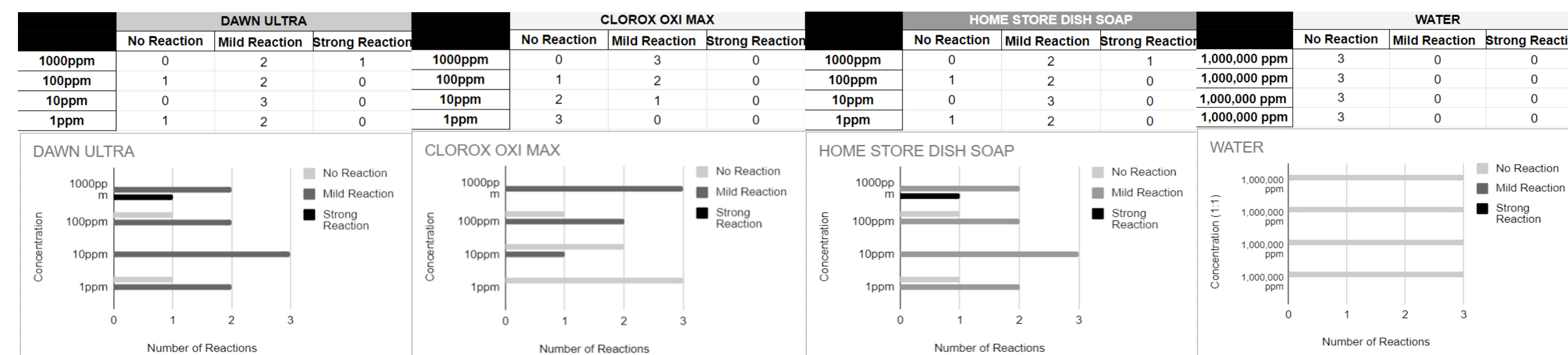
The experiment we did had two independent variables being type of dish soap used and dilution of said dish soap and one dependent variable being the reaction of the worms.

Our results were that worms react strongest to Homestore Dish Soap, a slightly weaker response to Dawn Ultra dish soap, an even weaker reaction to Clorox Oxi Max dish soap

Abstract

Dish soap is such a common item, it is important to study whether it has toxic effects on ecosystems, as the soap is used in events such as camping, dishwashing, and is sometimes dumped onto the ground and into the soil (ex. camping). Worms are essential to ecosystems as they not only have an important spot in the food chain, but also do tasks such as creating easier access to nutrients for plant roots, decomposing anywhere it goes, and helping to prevent flooding. It is obvious that the worms are necessary in the environment , and we want to know if dish soap is harmful to them when exposed. The experiment contains multiple dilution series to test the dish soap on the worms. We found that 1000ppm of the Clorox Oxi Max dish soap is a desirable dilution of dish soap to be used for minimal damage to the worms.

Data Presentation



Data tables + bar graphs showing data for worms reactions to different types of dish soap at different dilutions (1000 ppm - 1 ppm) and a control; water.

Data Analysis

Interpretation of the data was based mostly off of numbers. We found the amount of each kind of reaction and averaged them out. The more strong reactions a dish soap had the stronger it was and the more no reactions the worm had to the solution the weaker. This was a good way to rank most of the data we had, giving us the order of strongest to weakest Homestore, Dawn Ultra and Clorox Oxi Max. The biggest problem we ran into analyzing data was when we got a tie in our results. The way we resolved this was asking the testers of the group what one they thought was stronger when testing. They brought up good points about how homestore brought out a greater reaction in worms, saying that in the higher concentrations the worms kept showing a mild reaction even when taken out of the solution. We think the data is significant because of the way that it can show us the different strengths of the dish soaps we tested. This means that the general statistics of the data we took showed us how our data worked.

Statistics			
	Clorox	Dawn	Homestore
No Reaction%	50%	16.66%	16.66%
Mild%	50%	70%	70%
Strong%	0%	8.33%	8.33%

Discussion

Our most important results were that the worms reacted most strongly to the Homestore brand, Dawn was incredibly close to Home Store in reactions, & Clorox Oxi Max was the weakest. Our hypothesis of strength ordered from Oxi Max, Dawn, and Homestore was quite far off from our results. This is because of the way that it was advertised may have not been the exact way the product actually was (ex. Dawn Ultra being harmful to worms and Clorox Oxi Max being less concentrated) Though all of the soaps affected the worms in different amounts they all had a general theme where soap still affected worms at low dilutions. Some limitations of our experiment were how it wasn't in the worms real environment and instead of how it just showed direct contact from stimuli. Another flaw was the unreliability of the dilution in soap due to how dish soap has the property of sticking to surfaces making it harder to dilute even when flushing container with water. One last problem with the experiment was how the testing environment was not fully controlled. Ex. When doing a test with Dawn Ultra we received a strong reaction that may have been caused by lights being turned on in the testing room triggering a predator response in the worm. Despite the flaws in testing there are still pros to the experimental design. One of these pros is how the dish soap was correctly diluted. According to a article by watercalculator.org the average person uses 2.7 gallons of water to wash dishes and doing one load of dishes should use about one tablespoon of dish soap. Doing the math we see that water used to wash dishes is about 0.001% dish soap meaning 1000 ppm is a realistic dilution. Our work links back to our previous information in a couple ways, for example a worm is required for the environment, and they use their sensors to detect harmful substances and avoid them. This type of behavior is called avoidance. Testing worms avoidance is important to see if this chemical is safe the put into the environment if it were to get in. Testing to understand chemicals and their toxicity, on worms in this scenario is part of the larger study of toxicology.

Works Cited

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