How Does Bug Spray Effect Worms?

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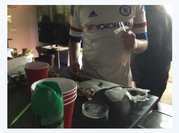
Introduction

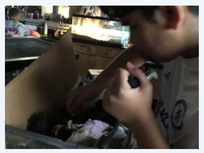
Toxicology is the study of toxins or chemicals. Toxicology is a field of science that helps us understand the effects the chemical could have on us. People refer toxicology to as "Science of Safety" because toxicologists study poisons, but now they have evolved their work into studying safety. A toxicologist is a scientist who has a strong understanding of biology and chemistry. Toxicology test chemicals to see of it is safe for human use. They also determine if it is safe for the environment. They play an important role in our ecosystem. DEET is the most common active ingredient in bug spray. It's a colorless, water-resistant synthetic chemical. Chemical Formula-C12 H17 NO. DEET in bug spray considered a category 3 toxic(slightly toxic). Overuse of deet may cause skin rashes, blisters, and skin and mucous membrane irritation. Worms are more basic than humans, but they have many of the same things. This makes them even better to use, as they represent a human but tiny. The worm in our experiment represents the humans flesh. Our testable question is how does different concentrations of bug spray affect worms? I think that 30% DEET will give the worm a severe reaction.

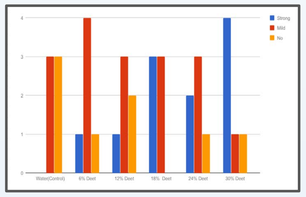
Abstract

In our experiment, we tested how tolerant worms are to deet. We obviously know that high percentages of deet will absolutely kill the worms, however we had to lower the deet percentages so that we didn't kill all the worms right off the bat. We used 1%, 2%, 3%, 4%, 5%, and 6% DEET. We did drop tests and burrowing tests so that we can have a large variety of different data to compare and analyze. For our burrowing test, we soaked the worms in a towel with a few drops of the solution and then soaked them in for 1 minutes. For the drop test we took a couple of worms and put them in a towel with dechlorinated water, then we put 5 drops of the solution onto the worm. The relevance of our project is that a lot of campers takes loads and loads of bug spray to keep the mosquitoes away. But when bug spray finds its way to the soil, it harms soil and it's organisms. We know that worms are sensitive to acidic soil and acids, so when the big spray gets into the soil, it soaks into their skin, slows reproduction rate, and also creates less oxygen in the soil. So it kills the worms.We tested this because we wanted to see how worms got affected and how their behavior to deet. Our experiment is important because we can now prove that bug spray has a negative effect on the soil and worms. If we hurt the worms they won't be compost the soil which helps the plants grow and plants can help all living things. We can make a ban on high levels of deet and we can also try to enforce natural bug spray because it is better for our skin and for the environment.

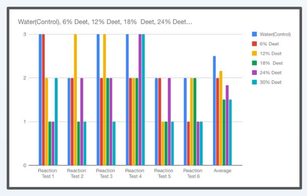









Drop Test Graph



Burrowing Test

Discussion

Worms have a severe reaction to concentration of deet above 3%. This is true because according our data from the drop test, worms reacted severely at 18% and higher. Although worms have had a severe reaction at 12% and 6%, it was only once, so the average of the results were around no reaction to mild reaction. This is relevant to my claim because it shows that's worms have severe reactions at 18% deet, which is 12% lower than what people normally use for bug spray (30% deet). My claim is also true because according to the data from the burrowing experiment, all the worms that were soaked in 4% or above died except one worm (which is an outlier in our data) due to a severe reaction to being soaked in solutions above 3% for a minute. This is significant because around 1 drop of 30% deet mixed with around 9 drops of water would make 4% deet, which would probably happen if it rains, which would cause worms to come out of the ground because it is dark outside (Toa, 2015), and if they are exposed to 4% they could possibly die. The last piece of evidence is an observation. Every time worms were dying in the burrowing test, we would know that they were having a severe reaction when they had mucus coming out of them. Every test above 3% on the burrowing had mucus left over in the petri dish. This piece of evidence is important because an earthworm breathes oxygen by absorbing it through its skin with mucus (Soniak, 2013), and if the worm loses mucus it can be hard for the worm to breathe. No other experiments have related results to our experiment because no tests tested one bug spray with different levels of deet, or use worms with any type of bug spray.

Data Presentation

Our independent variable is the concentration of DEET used in the experiment. Our dependent variable is the reaction of the worm, and seconds. Our control is the water. Their relation is that independent is the variable that changes, the dependent variable is the unit of the experiment, and the control is the variable that helps us interpret the data.

Materials and Methods

Our main objective for the experiment is to find the concentration of DEET that gave a worm the most severe reaction. So what we did was we did a drop test with 6%, 12%, 18%, 24%, and 30% DEET . Then we did a burrowing test with the same percents...In our experiment we decided to do 6 trials instead of four. We changed the concentration used for each test. Also we decided to do 1%, 2%, 3%, 4%, 5%, and 6% DEET instead of using 6%, 12%, 18%, 24%, and 30% DEET for the burrowing test because all the worms had died. We also used the burrowing test to determine their reaction. One thing we kept the same in our experiment is we kept the same contraction for the drop test. We used a timer to see how long it took for the worms to burrow. We stopped the time if the worm was more than half in the soil. We measured the drop test by looking at the worms reaction. The units we used for the burrowing test was seconds. But for the drop test we didn't use a unit for the drop. So we just used numbers to represent the worms reaction. We used statistics for our experiments. We also used p-value for our experiment Our graph represents our summary because we used a bar graph to represent the data.

Works Cited

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"Water(Control), 6% Deet, 12% Deet, 18% Deet, 24% Deet..." Water(Control), 6% Deet, 12% Deet, 18% Deet, 24% Deet.., 2018, docs.google.com/spreadsheets/d/149nKNniGP0tZJ27FeMLBLS9uEF_po3TmMu4wQJLoLr4 .

Data Analysis

The test used was correct for our experiment because our experiment is about finding the reaction the worms have with DEET. The main objective for the drop test is to find the reaction DEET has on the worm. The significant p-value explains how different the data is. So if the p-value was lower than 0, then that shows that the data is different. But if the data is more than 1, then that shows that the data is the same. Our results had the same pattern throughout our graph. This because all the results graph always increased. Also our data was different because our significant p-value was lower than 0.

Results

The average for the control was about 633 seconds. Then when we used 1% DEET the average increased to 1054 seconds. Then for 2% increased to 1200 seconds. Then for three percent it went to 1115.5 seconds. This shows a big increase from the control to the first percent. Then the slope stays kind of constant for the rest of the time, with little dips and increases.