How do Different Types of Hand Sanitizer Affect the Earthworms Desire to Burrow in the Soil.

Josh MacCudden
January 13, 2016
7-2
Mrs. Voelker
Abstract

The group of scientists wanted to test and see if hand sanitizer would affect earthworms negatively because people are putting sanitizer on their hands. The results showed that the sanitizer did affect the worms and they didn't want to burrow in the soil that was sanitized. The group of scientists thought that this experiment was important because if the earthworm's skin is going crazy when exposed to the sanitizer, what is happening to our skin? Also human movement is very similar to the earthworm’s movement. This is interesting because if the earthworms are reacting and moving the way they were which was squirming and jerking around then what is that doing to our hands? The group of scientists also tested scented hand sanitizer on to the worms. The group of scientists found that the results were about the same as the regular sanitizer except that the worms reaction when touching the sanitizer was less. This shows that the chemicals in regular sanitizer must be more harmful than the chemicals that make the scented sanitizer smell. This relates to our first statement of what is this doing to humans hands because the data shows that the scented hand sanitizer didn’t effect the earthworms as severely as the regular sanitizer did.

Introduction

Hand sanitizer is a liquid that people put on their hands to try and eliminate germs. In some cases it to make one’s hands smell good as well. Hand sanitizer has a type of alcohol in it called ethyl alcohol. Based on the scientists research hand sanitizer kills 99.9% germs on humans hands in 30 seconds and 99.999% in 60 seconds.

Although hand sanitizer has many uses some chemicals in sanitizer may not be really helping. In scented hand sanitizer for example one of the ingredients is triclosan,
which is a chemical that is supposed to kill bacteria. But in reality it is just absorbing the bacteria to make a super bacteria. Triclosan has been proven to resist antibiotics which would result in more people getting sick because they wouldn’t be getting the full results of the medicine. Triclosan isn’t the only chemical that isn’t really doing its job. Parabens found in all kinds of sanitizer has been linked to cancer which is in sharp contrast to reducing germs. Lastly in most scented sanitizers are chemicals added to make scents for the hand sanitizer and companies don’t have to mark the ingredients for the scents meaning the companies could put almost anything into the sanitizer to make these scents which people are now putting on their hands!

So this lead the group of scientists to the question is hand sanitizer safe and really helping people and furthermore worms? Based on these question the scientists thought that the sanitizer would not affect the earthworms and instead they would want to burrow in the soil with sanitizer because humans are usually drawn to sanitizer for their hands. The group of scientists also thought that the sanitizer wouldn’t affect the worm’s movement because our movement and earthworms movement is very similar so if earthworms react differently our hands should as well. Because of these questions the group of scientists were determined to really find out if these had a positive or negative impact on the earthworms.

Materials and Methods

For our experiment the group of scientists took an earthworm and placed it in a regular metal tin and did this.

First the group of scientists took 3 earthworms and labeled them, one, two, and three.
Second the group of scientists took neutral soil and squirted about 10 mL of water on to the dirt.

Third the group of scientists divided the soil into 2 sides. One side was to be the control side and the other was to be the regular hand sanitizer called Advanced Hand Sanitizer from Walgreens side to start.

Fourth the group of scientists squirted about one half of the regular non scented sanitizer bottle, making sure to cover the edges and all in the soil to make sure there were no weak spots with no sanitizer for the worm to burrow in.

Fifth the group of scientists placed worm 1 into the middle of the metal tin and started a timer for two minutes. In that two minutes the group of scientists watched how many times the worm would burrow into either side of the dirt. Whichever side it burrowed in the group of scientists tallied a one for whichever earthworm we were testing.

Sixth the group of scientists recorded the data and when the worm began to burrow the group of scientists would take the worm out and place it in the middle again also noticing any key observations.

Seventh the group of scientists would restart the timer and put in the 2nd worm and then the 3rd worm after the 2nd worm’s trial was complete.

Eighth, the group of scientists dumped all of the soil and took a new sample of soil to test. The group of scientists once again separated the soil into two sides. Instead of using the regular sanitizer we used scented sanitizer called Sonoma Sunflower which we dumped into the non-control soil.
Ninth the group of scientists repeated the 2 minute timing and testing of each worm to see how many times they would burrow.

Materials the group of scientists needed was regular hand sanitizer, a scented hand sanitizer, a metal tin, soil, regular water, and 3 earthworms. The safety measures we had to take was to make sure that we didn’t squirt any of the sanitizer into our mouths or eyes.

Outcomes were measured by the group of scientists whenever the worms made a full head burrow. The group of scientists did this because the group of scientists knew if the worm made a full head into either side of the dirt that it was going into that side and was going to burrow. Further the group of scientists thought that just a small touch of the earthworm’s head to either side wouldn’t be sufficient because the worm might have been making up his mind and wasn’t making a full burrowing motion. When measuring what a reasonable observation was if the earthworm went towards the side with the sanitizer, the group of scientists would monitor the reaction and write our observation down. The observations could have been whether the worm freaked out and immediately left or if it indeed burrowed in the sanitized soil and etc.

Some of the methods we used to gather our data was that we first decided to use 2 minutes as our time to experiment per worm. The group of scientists chose this because if we were to use 1 minute the worms who move generally slow so only giving them 1 minute seemed unfair and not a precise way to complete and record the group of scientists data. The group of scientists also didn’t want to do 5 minutes because at some point the worms would become more immune to the sanitizer and the experiment
wouldn’t work as good as it should have. So using all of these considerations the group of scientists finalized that the group of scientists would use 2 minutes as the timer.

Results

<table>
<thead>
<tr>
<th></th>
<th>Times touched control in 2 min</th>
<th>Times touched Regular sanitizer in 2 min</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worm 1</td>
<td>1</td>
<td>0</td>
<td>every time worm touched regular sanitizer the worm backed away</td>
</tr>
<tr>
<td>Worm 2</td>
<td>2</td>
<td>0</td>
<td>never wanted to go towards the sanitizer</td>
</tr>
<tr>
<td>Worm 3</td>
<td>2</td>
<td>1</td>
<td>Touched sanitizer and instantly backed off but may have found un sanitized spot to burrow in</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Times touched control</th>
<th>Times touched scented sanitizer in 2 min</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worm 1</td>
<td>1</td>
<td>0</td>
<td>Touched sanitizer and immediately jumped back and went towards control</td>
</tr>
<tr>
<td>Worm 2</td>
<td>1</td>
<td>1</td>
<td>Didn't seem affected by the sanitizer even though the worm went directly into the sanitizer.</td>
</tr>
<tr>
<td>Worm 3</td>
<td>2</td>
<td>0</td>
<td>Never went towards the scented sanitizer</td>
</tr>
</tbody>
</table>
The group of scientists experiment was to take scented sanitizer and regular sanitizer and see how they would affect the earthworms. The goal was to see if the earthworms would burrow into the soil that the sanitizer was in. The group of scientists did this because they wanted to know if the substance people are putting on their hands is affecting us in a negative way then the group of scientists believed it to be. The group of scientists did this because they wanted to see if some of the chemicals in hand sanitizer is affecting us. This is because the worms move like us so if they are moving oddly and reacting by not wanting to burrow in the soil with the sanitizer what are those chemicals doing to our hand? The way the group of scientists set up their experiment was that they would see how many times the earthworm would touch either side of the soil. The group of scientists thought that the worms wouldn’t go to the hand sanitizer side and not be affected because we put hand sanitizer on our hands so the group of scientists thought that it shouldn’t affect the worms.

Here are the group of scientists results. When first trying the regular hand sanitizer the group of scientists found that the earthworms deliberately did not go towards and burrow in the contaminated sanitizer. This was interesting because the group of scientists thought that the regular hand sanitizer would have less harmful chemicals because it isn’t scented so it wouldn’t have the chemicals that make it smell. Then when we tried our scented sanitizer we saw that the earthworms also really did not want to go by the dirt that had the sanitizer in it. Although when testing the scented sanitizer only 2 worms actually went by the sanitized spot the other one never even went towards the sanitizer. In the group of scientists experiment the independent variable was the type of sanitizer the group of scientists used, whether it was the regular
or scented hand sanitizer. The group of scientists dependant variable was where the worms were going to burrow, and their control variable was the soil in the sense that it was the same soil every test.

Discussion

When looking at the experiment’s data the group of scientists saw that the earthworms went to the control side 9 times out of the 11 burrows that all 3 earthworms made in both tests. The group of scientists thought this was interesting because they expected the earthworms to burrow into the hand sanitizer side without any doubt or hesitation. The group of scientists thought this because we put the chemicals on our skin so the sanitizer shouldn’t affect the earthworms but the group of scientists was wrong. The earthworms went out of their way not to burrow into the soil. The 2 times the earthworms did burrow into the sanitized sides the group of scientists believed they made an error. The group of scientists believe that they may have missed a spot for the sanitizer and so the earthworms would go to that area. This may or may not have happened because the group of scientists may not have missed and the worms genuinely went and burrowed in that side and because of that fact the group of scientists decided to keep the burrow as a full burrow.

The group of scientists results were absolutely relevant because they showed that the chemicals really are negatively affecting the earthworms so just imagine what those chemicals are doing to our bodies. 9/11 is equal to approximately 82%. So more than 80 percent of the tests burrowed into the non-sanitized and the less than 20% that didn’t burrow into the non-sanitized side was a possible human error. More than 80% is
a pretty good indication that most of the chemicals in the sanitizer are really harmful and not helping humans at all. Instead these chemicals are really “hurting” us in a way.

The group of scientists results showed that the group of scientists thesis was completely wrong. Based on the data the worms reacted exactly how humans should react based on the description of the chemicals. The worms didn’t want to burrow into the sanitized soil most likely because of the effects of the chemicals that they have on our movement (cancer) and the effects on our skin. Some further investigation would be to try out some other scents to see how different the chemicals really are depending on the scents. Other experiments the group of scientists could do would be to drop sanitizer directly onto the heads of the earthworms to see what their initial reaction to the sanitizer would be.

Conclusion

In essence when testing both regular and scented hand sanitizer the group of scientists found that the earthworms did not want to burrow in either the regular or scented hand sanitizer and when they did burrow in the sanitized side there was a possible human error. This shows that maybe the chemicals that are supposedly “killing” the germs on our hands are in reality aren’t killing are our germs what so ever.

Appendix

References

http://www.cdc.gov/handwashing/show-me-the-science-hand-sanitizer.html
